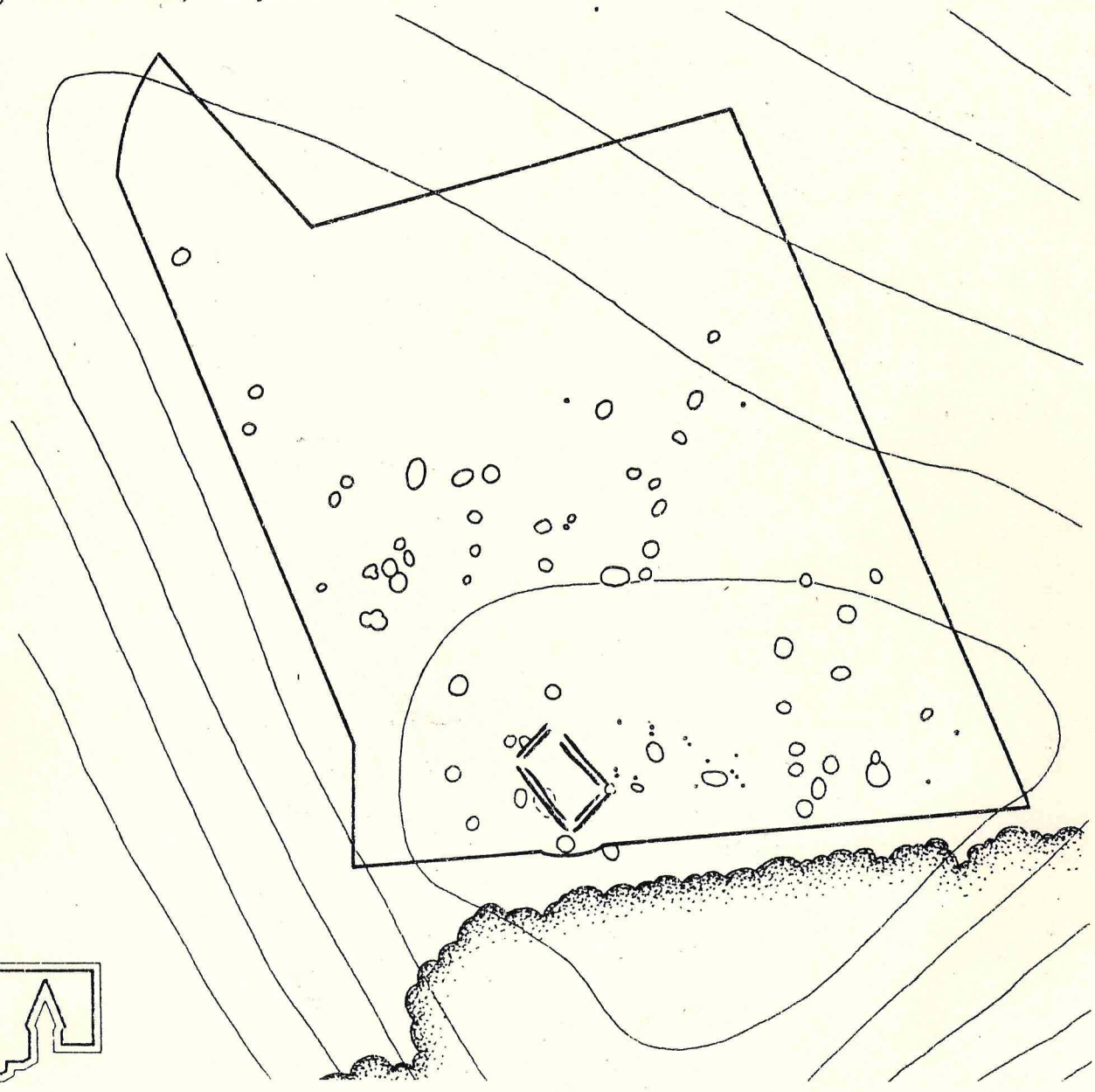
THE LIGHTFOOT SITE: AN EARLY LATE WOODLAND AND MISSISSIPPIAN OCCUPATION IN THE UPPER GALUM CREEK VALLEY, PERRY COUNTY, ILLINOIS

MARK J. WAGNER

with contributions by

**Brad Koldehoff, Candace Lutzow,
Mary R. McCorvie, and Jonathan A. Bloom**



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Phase III Excavations
at Consolidation Coal Company,
Northfield, Burning Star Mine #4

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PREFACE

This report is the fifth volume in American Resources Group, Ltd.'s, Preservation Series. It presents the results of archaeological investigations conducted by American Resources Group, Ltd., for the Midcontinent Region of Consolidation Coal Company in southern Illinois. The research is funded by the company and fulfills state and federal surface mining regulations as they relate to cultural resources.

Future volumes in the series will present the results of ongoing survey and mitigation activities conducted by American Resources Group, Ltd., for Consolidation Coal Company as well as other preservation and cultural resource topics. Those volumes which relate to cultural resource assessments in the till plains physiographic region of southern Illinois will explore a variety of research questions including prehistoric settlement patterns, subsistence strategies, chert exploitation, stone tool technology, and ceramic change. Much historical and historic archaeological research is being conducted and will also be presented in future volumes.

We would like to thank Consolidation Coal Company for their commitment to preserving the cultural heritage of Illinois. Thanks also to Vic Ordija and the many other employees of Consolidation Coal Company's Illinois operations for their fine support and cooperation.

MJM

ABSTRACT

During 1983 and 1984, American Resources Group, Ltd., conducted archaeological investigations at the Lightfoot site (21C4-35), a multi-component prehistoric site located in Perry County, Illinois, as part of a larger cultural resources project in the Consolidation Coal Company's Burning Star Mine #4. Although evidence of Archaic and Crab Orchard utilization of the site was found, the main prehistoric occupations dated to the early Late Woodland (ca. A.D. 400-600) and Mississippian periods (A.D. 1150-1450). The investigations revealed that 62 pit features were present at the site including 35 features containing Late Woodland ceramics, 26 aceramic features, and 1 Middle Woodland Crab Orchard feature. The remains of a badly eroded Mississippian wall trench structure with a double set of wall trenches was the only definite subsurface Mississippian feature at the site. A cluster of 15 post molds located north of the Mississippian structure was interpreted as the possible remains of a Late Woodland structure. The small Late Woodland ceramic assemblage exhibits early characteristics including large interior punched nodes, angled cordmarking, and recurved and restricted orifice jar forms. A single radiocarbon date of 1370 $\pm$ 70 B.P. (A.D. 580 $\pm$ 70) was obtained on a wood charcoal sample from a pit feature containing Late Woodland ceramics. Faunal and botanical data indicate exploitation of only a relatively few of the many natural food resources available in the local environment. Artifact anlayses indicated that a limited range of tools was present at the site in comparison to the larger Late Woodland settlements in the project area. Based on the restricted artifact inventory and limited subsistence data, the Lightfoot site appears to represent a seasonally occupied hunting and foraging camp that was intermittently occupied during the early Late Woodland period. During the Mississippian period, the Lightfoot site represents one of a series of dispersed Mississippian homesteads located along Galum Creek.

ACKNOWLEDGEMENTS

The author wishes to thank the personnel of the Consolidation Coal Company, particularly Mr. Vic Ordija, for their assistance in the completion of this project. The hard work put in by the archaeological field crew under sometimes adverse conditions is also acknowledged. Mark J. Wagner was the field director, and Mary R. McCorvie was the field supervisor. The archaeological field crew included, at various times, Jonathan Bloom, Alan J. Brown, David Herdrich, George R. Holley, Scott Miller, Jerry Moore, Julie Phillips, and Mark Phillips. The initial processing of the recovered materials was performed by the same individuals. Specialized analyses of the recovered materials were conducted by the Jonathan Bloom, faunal analysis; Brad Koldehoff, lithic analysis; Candace Lutzow, botanical analysis; and Mark J. Wagner, ceramic analysis. Jim Balsitis prepared the majority of the figures in this report with assistance by Mark Phillips. Finally, Joan Listen and Linda Ober are acknowledged for the word processing, editing, and technical preparation of this report.

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CHAPTER I. INTRODUCTION

Mark J. Wagner

This report presents the results of hand and mechanical excavations at the Lightfoot site (21C4-35), a multicomponent prehistoric site located in the Northfield, Burning Star Mine #4, Perry County, Illinois. Archaic through Mississippian occupations were identified at the site with the major occupation dating to the early Late Woodland period. The Northfield is located along upper Galum Creek northeast of Cutler, Illinois (Figures 1 and 2), and is an extension of mining operations which began south of Jamestown. Approximately eight square miles (2,023 ha) are contained in the research area, which is drained by Galum Creek and two intermittent tributaries, Rock Fork Creek on the west and Bonnie Creek on the east.

These excavations were part of a larger cultural resources assessment project which included the location and assessment of all archaeological sites located within the Burning Star Mine #4 (Haas and McNerney 1980). The location and assessment of cultural resources are now required for any undertakings which necessitate federal permits or licenses by authority of Public Law 93-291, Sections 3 and 4, Archaeological and Historic Conservation Act, 1974. Other legislation relevant to this research includes the National Historic Preservation Act of 1966 and Executive Order 11593. The diversions of Galum Creek and related alterations of the environment at the Northfield require a federal permit by authority of Public Law 92-500 (amended 1977), Federal Water Pollution Control Act, 1972. Such permits are issued by the Secretary of the Army, acting through the Chief of Engineers (PL-92-500). The Illinois Surface Coal Mining Land Conservation and Reclamation Act (PA81-1015) also encourages the protection of cultural resources (Section 7:02.[b][2]).

Test excavations began at the Lightfoot site in August 1983. Mechanical excavations, including the complete removal of the site plow zone, were conducted in the spring of 1984. Laboratory analysis, research, and report preparation were carried out in the fall and winter of 1984.

Environmental Setting

The following discussion is limited to a description of the environment in the immediate site area. Detailed information regarding the climate, physiography, hydrography, pedology, vegetation, and fauna

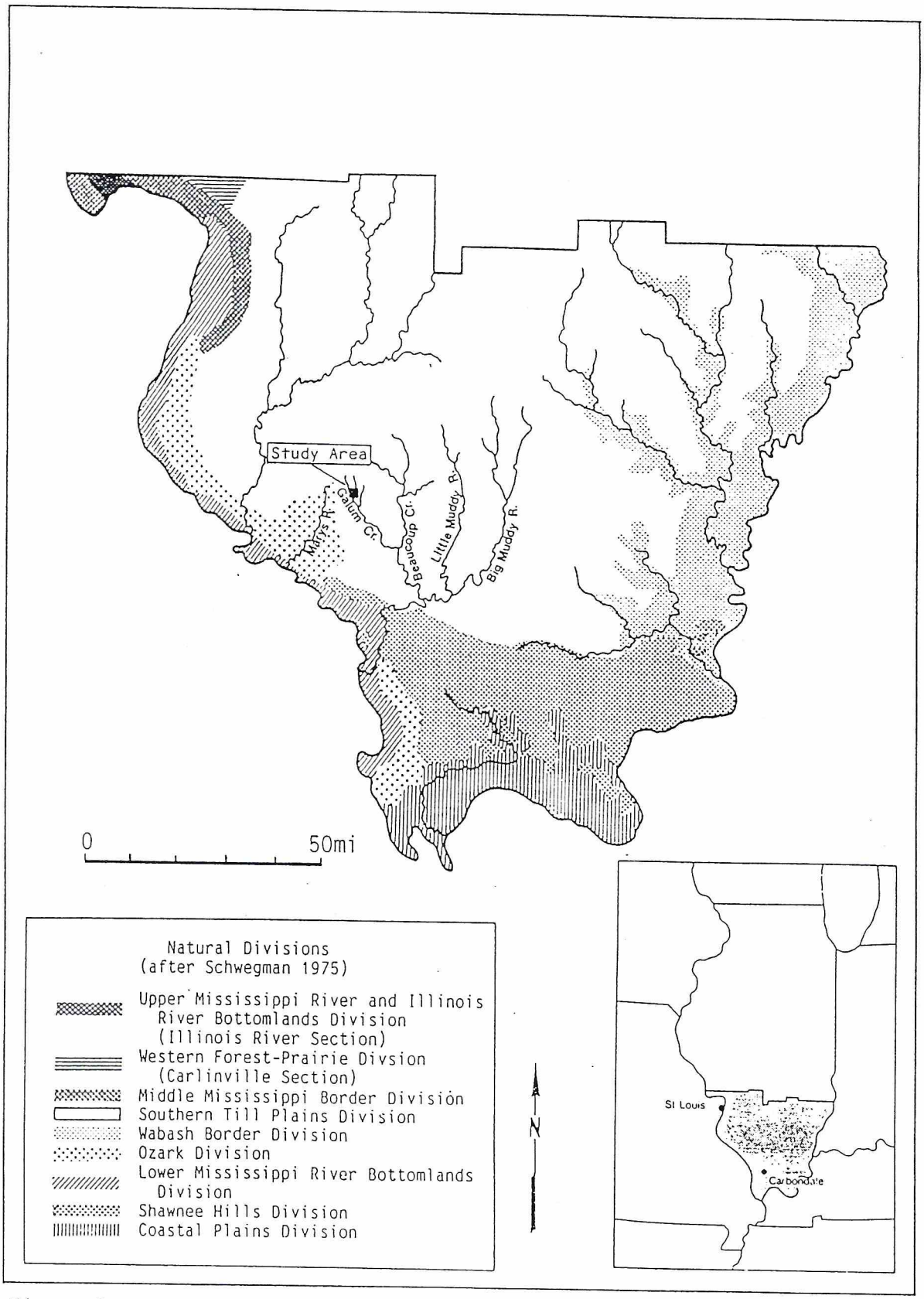


Figure 1. Physiographic setting, Northfield study area.

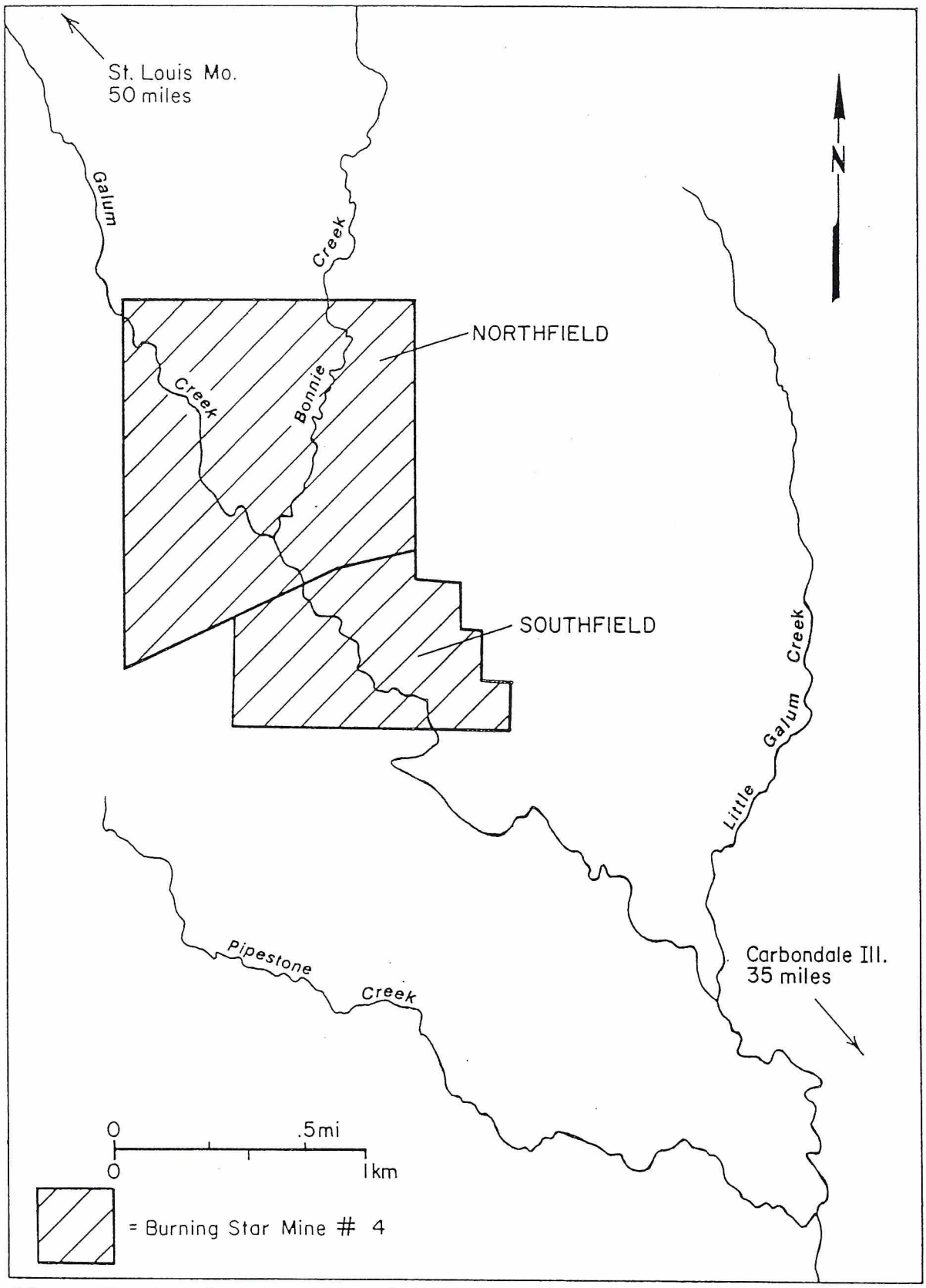


Figure 2. Burning Star Mine #4 and vicinity.

of the Burning Star Mine #4 can be found in Haas and McNerney (1980:7-39; 1986). The reader is referred to those reports for further information.

The Lightfoot site was located in the upper reaches of Galum Creek, a tributary of Beaucoup Creek which is part of the Big Muddy River drainage (Figure 1). The site was located on the top of a northeast-southwest oriented ridge spur at an elevation of 138 m (460 ft) ASL overlooking Galum Creek which was located immediately adjacent to the base of the ridge containing the site (Figure 3). The confluence of Galum, Bonnie, and Rock Fork creeks was located approximately 90 m (300 ft) north of the site. Galum Creek holds water year round in the vicinity of the Lightfoot site, even in the driest summers.

The valley bottom located to the north and east of the site on the other side of Galum Creek is broad and flat, varying in width from 1,100 to 2,000 ft. This valley was subjected to repeated flooding during the spring of 1983 following periods of heavy rain. Some of this flooding may be associated with the channelizaton of the upper portion of Galum Creek with the increased water volume causing the three creeks in the area to back up and overflow during periods of heavy rain. Older people who had formerly lived in the area, however, stated that heavy flooding of Galum and Bonnie creeks occurred as early as the 1930s, long before the creeks were disturbed heavily by coal mining activities. One older man stated that he could remember seeing the creek bottoms completely covered by water and that he had used a john boat on several occassions over the years to travel across the creek floodplains during periods of heavy flooding.

Vegetation

The topography of the upper Galum Creek valley is comprised of bottomland, slope, and upland elements, each of which contained distinctive vegetational resources. The natural vegetation of the creek bottomland has been severely disturbed by farming, with second growth forest restricted to the margins of Galum Creek and fencelines. Based on the presence of Bonnie-Belknap soils, presettlement floodplain vegetation would have consisted of a bottomland forest. Englemann's (1863:394) description of the bottomland forest communities in Jackson and Perry counties states that

> . . . The timber is heavy and very tall and consists principally of the swamp white oak (Quercus bicolor) and the pin oak (Q. palustris), with some scaly barked hickory (Carya alba), but where the creeks enter the limits of the underlying limestones and shales, the growth is much more varied and consists, in addition . . . of bur oak (Q. macrocarpa), red oak (Q. rubra), laurel oak (Q. imbricaria), ash, black walnut, hazel, and many others."

McNerney (1974:10) reported that the bottomland forest community in western Perry County was dominated by the pin oak (Q. palustris), white oak (Q. bicolor), ash (Fraxinus spp.), elm (Ulmus spp.) and gum (Nyssa

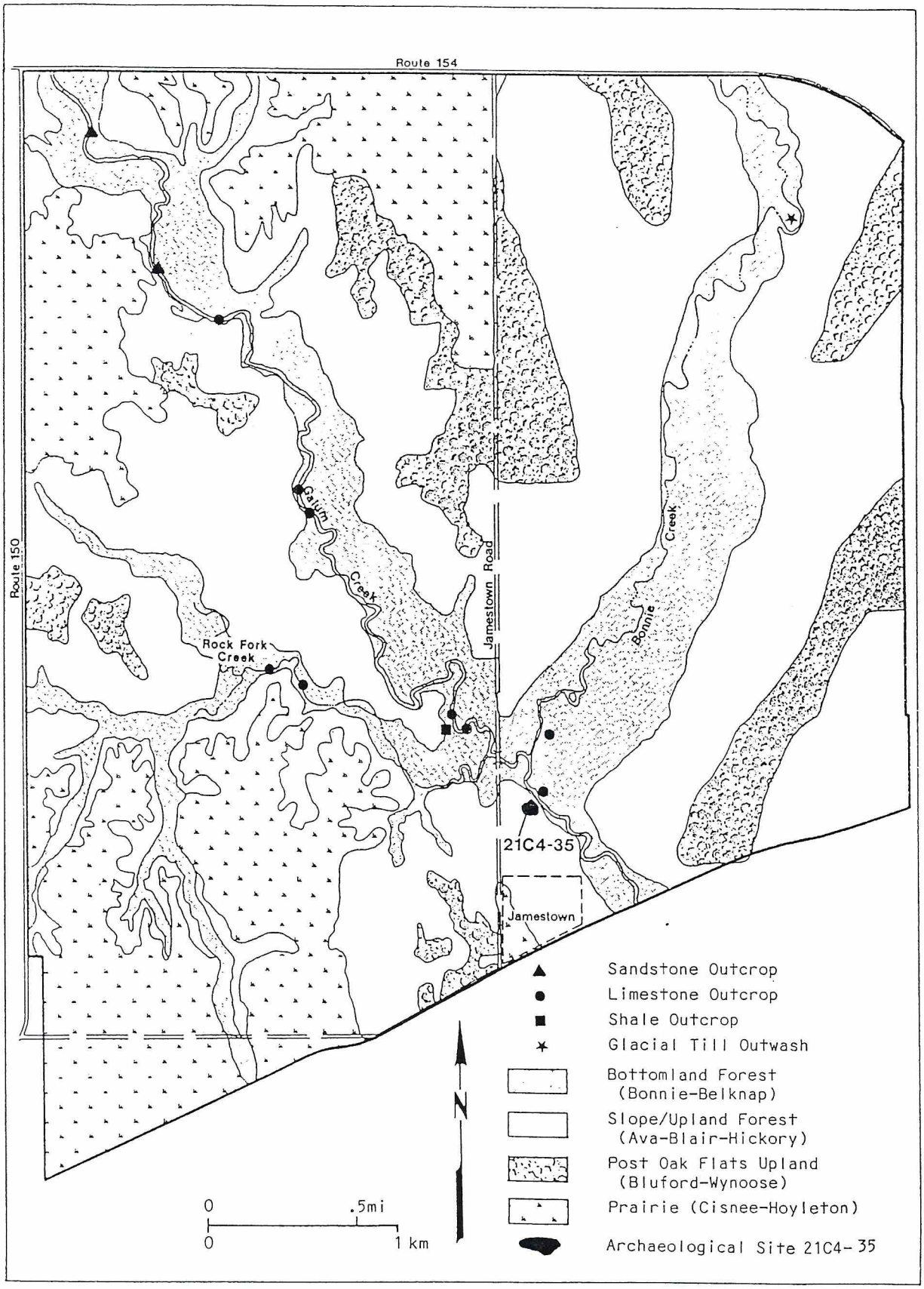


Figure 3. Local environmental setting, Northfield study area.

sylvatica). Spanish oak (Q. falcata) and shagbark hickory (C. ovata) were also present. Jenkusky et al.'s (1979) survey of the bottomland and upland plant communities in the mine area divided the vegetation in these areas into dominant overstory vegetation over 10 ft in height and dominant vegetation under 10 ft in height. The dominant overstory vegetation in the bottomland consisted largely of box elder (Acer negundo), sugar maple (A. saccharum), river birch (Betula nigra), and silver maple (A. saccharinum). Species present in minor quantities included hackberry (Celtis occidentalis), sourgum, pin oak, wild black cherry (Prunus serotina), honey locust (Gleditsia triacanthos), shingle oak, green ash (Fraxinus pennsylvanica), and sycamore (Platanus occidentalis) (Table 1). The absence of oak and black walnut (Juglans nigra) in this most recent survey probably is associated with historic land clearing practices and the modern economic value of these species.

The importance of the oak-hickory forest community to prehistoric societies in eastern North America has been demonstrated repeatedly (Chapman and Shea 1981:61-84; Faulkner and McCollough 1973; Johannessen 1984). The shagbark hickory produces a sweet nut which can be collected from September through December. This nut can be eaten fresh or stored for later use (Zawacki and Hausfater 1969:18). The nut crops of the bur oak, white oak, red oak, pin oak, and black walnut also are known to have been utilized by historic American Indian groups (Yanovsky 1936:16-18). Other bottomland tree species with known aboriginal uses include the black cherry, green ash, silver maple, hackberry, honey locust, and box elder. The fruit of the black cherry can be eaten fresh or dried, while the twigs can be used to produce a beverage (Yanovsky 1936:35). The cambium of the green ash and the sap and bark of the silver maple

Table 1. Dominant Overstory Vegetation* of Lowland-Riparian Forest Transect, Jamestown North Area (from Jenkusky et al. 1979).

Species**	Percent Composition	Density #/Acre	Average DBH Inches
Box Elder	37.7	134	8.2
Sugar Naple	22.3	79	6.7
River Birch	12.4	44	11.2
Silver Maple	7.3	26	12.2
Hackberry	2.5	9	8.3**
Sourgum	2.5	9	8.0**
Pin Oak	2.5	9	3.5**
Wild Black Cherry	2.5	9	10.5**
Honey Locust	2.5	9	23.6**
Shingle Oak	2.5	9	4.5**
Green Ash	2.5	9	14.0**
Sycamore	2.5	9	17.5**

*Over 10 ft high and DBH greater than 2.5 in.
**Only one in sample

also can be used as food (Yanovsky 1936:52,42). The fruit of the hackberry becomes available in August and can be collected all winter. Historic Indians pounded the fruit and mixed it with parched corn and fat (Faulkner and McCollough 1973:19; Gilmore 1977:24). Sugar can be obtained from the honey locust and the box elder (Zawacki and Hausfater 1969:32).

Jenkusky et al. (1979) identified a bottomland understory plant community consisting of 29 species with stinging nettle (Urtica dioica), jewel weed (Impatiens biflora), cream violet (Viola striata), and buttercup (Ranunculus spp.) comprising 64.6% of the identified plants (Table 2). Plants with identified aboriginal food use include the sedge (Cyperacae), Virginia creeper (Parthenocissus quinquefolia), wild onion (Allium canadense), and spicebush (Lindera benzoin) (Yanovsky 1936:9, 11-12, 26, 42). The stems and tuberous bases of the sedge were eaten as were the bulbs of the wild onion. The leaves of the spicebush can be used as a tea substitute, while the stalks and fruit of the Virginia creeper were eaten.

Zoanetti (1974:1-40) separated the uplands of the upper Galum Creek drainage into three environmental zones on the basis of soil types and plant communities (Figure 4). These were the slope woodlands, post oak flats, and prairie zones. The Lightfoot site was located entirely within the slope woodland zone, while sections of the post oak flats and prairie were located within a mile of the site (Figure 3). Haas and McNerney (1986:15) define the slope woodland zone as a transitional environmental zone with the vegetation on the lower slopes and small drainageways being similar to the bottomland, while the upper slopes are more similar to the post oak flats. Zoanetti (1974) recognized white oak and black oak as being the dominant tree species within the slope woodland zone, while red oak and pignut hickory were important subdominant species.

Sections of the post oak flats are located less than 1/2 mi north and 2/3 mi to the south and southeast of the Lightfoot site (Figure 3). The post oak flats generally coincide with the Bluford-Wynoose soil association. The flats are nearly level stretches of upland with widely dispersed open woods dominated by post (Q. stellata) and black jack (Q. marilandica) oaks. Little undergrowth was present within these woods in comparison to the bottomlands (Englemann 1863:390). Zoanetti (1974:8-9) noted that other oaks and hickories can be found in certain areas of the post oak flats, with pin oaks and shingle oaks (Q. imbricaria) occurring in wet areas.

Jenkusky et al.'s (1979) survey of the uplands within the mine failed to distinguish between the post oak flats and the slope woodland forest zones (Table 3). On the basis of the wide species diversity recorded (and the absence of post and black jack oaks), it would appear that their survey applies to the slope woodland forest zone. The upland overstory was comprised of 10 species, with red oak, black oak, pignut hickory (C. glabra), white oak, shagbark hickory, and sweet pignut hickory comprising 79.9% of the vegetation. All six of these nut-bearing trees were utilized by historic Indian groups (Yanovsky 1936). With

Table 2. Dominant Vegetation Under 10 ft of Lowland-Riparian Forest Transect, Jamestown North Area (from Jenkusky et al. 1979).

Species	Percent Composition
GROUND COVER*	
Stinging Nettle	31.0
Jewel-Weed	12.6
Cream Violet	12.3
Buttercup	8.7
Green Ash	4.4
Sedge	4.2
Poison Ivy	3.6
Virginia Creeper	2.9
Sweet-Scented Bedstraw	2.4
Bottlebrush Grass	2.4
Blue-Eyed Mary	2.1
Violet	2.0
Fowl Manna Grass	1.9
Virginia Cowslip	1.6
Common Blue Violet	1.3
Wild Onion	1.2
Cat Brier	1.1
Slippery Elm	1.1
Spicebush	0.6
Box Elder	0.6
Gray's Sedge	0.5
Water Hemlock	0.5
Self-Heal	0.5
Hackberry	0.3
Goldenrod	0.2
Japanese Honeysuckle	0.2
Blue Phlox	0.1
UNDERSTORY**	
Green Ash	83.3
Spicebush	16.7

*Vegetation, 0 to 1 ft high, covered 78.6% of transect
**Vegetation, 1 to 10 ft high, covered 6.0% of transect

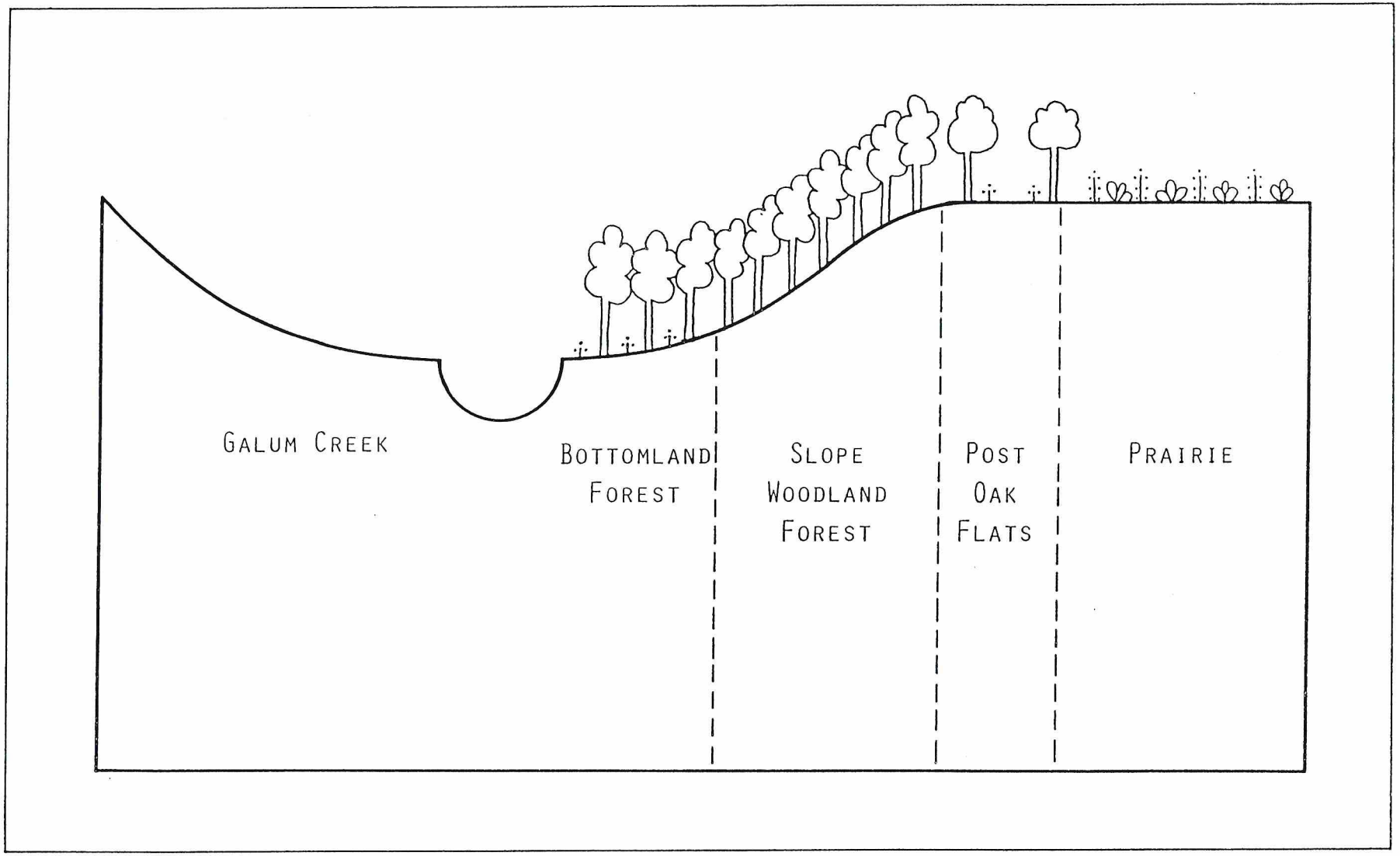


Figure 4. Ideal environmental cross section, upper Galum Creek locality.

Table 3. Dominant Overstory Vegetation* of Upland Forest Transect, Jamestown North Area (from Jenkusky et al. 1979).

Species**	Percent Composition	Density #/Acre	Average DBH Inches
Pignut Hickory	27.3	118	7.8
Sweet Pignut Hickory	17.4	75	5.6
Shagbark Hickory	15.0	65	6.0
White Oak	15.0	65	8.5
Green Ash	7.4	32	3.1
Slippery Elm	5.1	22	3.0
Red Bud	5.1	22	2.9
Red Oak	2.5	11	20.1**
Black Oak	2.5	11	14.3**
Sugar Maple	2.5	11	3.2**

*Over 10 ft high and DBH greater than 2.5 in.
**Only one in sample

regard to the other species, the cambium of the slippery elm could be eaten in the spring, while sugar could be obtained from the sugar maple (Zawacki and Hausfater 1969:34). The inner bark of the slippery elm also was mixed with buffalo fat for use as both a flavoring and as a preservative by historic Indian groups along the Missouri River (Gilmore 1977:25). The upland understory was comprised of 18 species, with mayapple (Podophyllum peltatum), Virginia creeper, and slippery elm making up 91.2% of the ground cover (Table 4). Previously mentioned food resources within this understory include the slippery elm, Virginia creeper, green ash, wild black cherry, and shagbark hickory. The bulbs of the white dog toothed violet (Erythronium albidum) could be eaten raw, while the berries of the false Solomon's seal (Smilacina racemosa) can be collected in the fall (Zawacki and Hausfater 1969:26,36). Both the red mulberry (Morus rubra) and mayapple produce edible fruit (Yanovsky 1936).

Prairie areas (defined on the basis of Cisne-Hoyleton soils) were located within 3 mi north and 1 mi southwest of the Lightfoot site (Figure 3). Voigt and Mohlenbrock (1964) note that southern Illinois prairies were comprised of big bluestem (Andropogon gerardii), Indian grass (Sorghastrum nutans, wild rye (Elymus canadensis), switch grass (Panicum virgatum), and slough grass (Spartina pectinata). In terms of wild plant foods, the prairies would have contained the least resources of the four environmental zones within the upper Galum Creek valley. However, historic Indian groups along the Missouri River collected slough and other prairie grasses for use as thatching for permanent houses (Gilmore 1977:14).

Table 4. Dominant Vegetation Under 10 ft of Upland Forest Transect, Jamestown North Area (from Jenkusky et al. 1979).

Species	Percent Composition
GROUND COVER*	
Mayapple	48.8
Virginia Creeper	22.4
Slippery Elm	20.0
False Solomon's Seal	2.4
Red Trillium	1.4
Green Dragon	1.4
Green Ash	1.2
White Dog-Toothed Violet	1.0
Common Cinquefoil	0.6
Wild Black Cherry	0.4
Sweet-Scented Bedstraw	0.2
UNDERSTORY**	
Slippery Elm	53.4
Green Ash	18.4
Red Mulberry	16.9
Red Bud	8.5
Shagbark Hickory	2.8

*Vegetation 0 to 1 ft high, covered 40.8% of transect
**Vegetation 1 to 10 ft high, covered 70.8% of transect

Fauna

Prior to Euro-American settlement, the upper Galum Creek valley would have contained a wide variety of avian, mammalian, and aquatic fauna. The destruction of habitats as the result of deforestation and land clearing associated with farming undoubtedly resulted in the extirpation of many species. Nevertheless, Jenkusky et al.'s (1979) survey of the mine area documented that a diverse animal population still existed within the upper Galum Creek valley. The Lightfoot site's location on the edge of a ridge spur overlooking the creek floodplain would have allowed its inhabitants to exploit fauna from both the bottomland and upland environments.

The bottomland would have contained the widest range of faunal species. Jenkusky et al. (1979) documented that 17 of 32 potential fish species native to southern Illinois were present in Galum Creek. All of these fish are characteristic of species that prefer muddy bottomed, low gradient creeks. Prior to the introduction of farming and the subsequent erosion of soil into the creeks, the Galum Creek drainage probably supported additional fish species that have low tolerances for disturbed habitats. Game species in the Galum Creek drainage include the largemouth bass (Micropterus salomides), green sunfish (Lepomis cyanellus), longear sunfish (L. macrochirus), white crappie (Proxomis annularis), bluegill (L. macrochirus), and pirate perch (Aphredoderus sayanus). Rough fish include the black bullhead catfish (Icatalurus melas), creek chub (Semotilus atromaculatus), golden shiner (Notemigonus crysoleucous), redfin shiner (Notropis chiliticus), and the creek chubsucker (Erimyzon oblongos). Small fish species consisted of the bluntnose minnow (Pimephales notatus), flathead minnow (P. promelas), blackstripe topminnow (Fundulus notatus), and slough darter (Percidae spp.). This is a relatively restricted range of species, and fish may not have represented an important food resource to the Lightfoot site inhabitants. Further, as Faulkner and McCollough (1973:42) have noted, the Centrarchidae (basses, sunfish, and crappies) prefer deeper pools and do not congregate in large numbers during spawning. As a result, they probably could not have been netted or trapped in large numbers and may have represented a minor food resource.

The range of molluscan species within the study area is unknown. Disturbances to the creek from soil runoff and mining activity have resulted in the extirpation of most molluscan fauna in this section of the Galum Creek drainage. Live specimens identified as "floaters" (Anadonta grandis) were recovered as isolated individuals from the upper reaches of Bonnie Creek during the course of the field investigations. The recovery of shell-tempered ceramics at Mississippian sites in the mine indicates that molluscan fauna were numerous enough to be collected and used in the manufacture of ceramic vessels during this time period. It is doubtful if they occurred in large enough quantities to represent a significant food resource given the small size of Bonnie, Rock Fork, and Galum creeks.

Semiaquatic fauna present within the project area that prefer a bottomland environment include the mink (Mustela vison), beaver (Castor

canadensis), raccoon (Procyon lotor), and muskrat (Onoodatra zibethica) (Jenkusky et al. 1979:15). Other animals present within the bottomland in 1979 but which also occur in the uplands include the opossum (Didelphia virginia), gray fox (Urocyon cineoargentus), eastern gray squirrel (Sciurius carolinesis), fox squirrel (S. niger) and southern flying squirrel (Glaucomys volans). Animals not recorded by Jenkusky et al. (1979) but noted during the course of excavations in the mine include the striped skunk (Mephitis mephitis), groundhog (Marmota momax), and white-tailed deer (Odocoileus virginianus). Amphibians and reptiles documented within the bottomland incuded black racer snakes, the eastern box turtle (Terrapene carolina carolina), and the midland painted turtle (Chrysemys pictamarginata). Jenkusky et al. (1979) recorded no avian fauna in the project area with the exception of the green heron, but the Canadian goose (Branta canadensis), mallard duck (Anas carolinesis), redtailed hawk (Buteo platypterus), and turkey vulture (Carthaartes aura) were observed in the Galum Creek area during the archaeological investigations. Ducks and geese may not have been as prevalent prehistorically in the project area as they are today. The old strip mine pits in the Southfield area of Burning Star Mine #4 have been converted into lakes that attract large numbers of these birds.

Upland fauna recorded by Jenkusky et al. (1979) include the gray fox, eastern gray squirrel, eastern fox squirrel, southern flying squirrel, and white-tailed deer. The wild turkey (Meleagris gallopavo) is present in the uplands of Perry and Randolph counties and undoubtedly was present within the upper Galum Creek valley at one time. Turkeys may have been hunted throughout the year although they are most easily hunted during the fall and winter when they congregate in large flocks in upland areas to feed on nut mast (Faulkner and McCollough 1973:48-49).

Animal species now extirpated from the project area that would have represented potential food resources include the American elk (Cervus canadensis), black bear (Ursus americanus), and passenger pigeon (Ectopoistes migratorius). Artifacts made from elk and bear remains have been recovered from pit features at the Jamestown site (21C4-14), a large Late Woodland site located less than 1/4 mi north of the Lightfoot site (Falk 1987). Other large mammals known to have been present in Perry and Randolph counties during the historic period include the cougar (Felis concolor) and gray wolf (Canis lupus). Bounties were offered for wolves during the early nineteenth century in Randolph County. Robert Huggins, an early settler in both Randolph and Perry counties, received a bounty for turning in a wolf scalp at Kaskaskia in 1804 (McDonough 1883:101). Passenger pigeon remains were recovered from the Davis site (21D3-246), an early to mid-nineteenth century American farmstead along Beaucoup Creek, indicating that these birds were present in Perry County at least up until the mid-1800s (McCorvie 1987).

Lithic Resources

The upper Galum Creek valley contains a relatively restricted range of lithic resources, most noticeably lacking any type of high quality chert. Lithic materials present within the upper Galum Creek valley

include limestone, shale, sandstone, limonite, glacial redeposited chert, and igneous/metamorphic rock (Figure 3). Limestone outcrops in bedded formations throughout the three creeks but is more prevalent in the southern half of the project area near the confluence of Bonnie, Galum, and Rock Fork creeks. During the Mississippian period, limestone was used in the construction of graves throughout southern Illinois and other parts of the southeast and Midwest. Such graves were present in the project area at a mortuary site (21C4-9) and at two homestead sites, the Bonnie Creek site and the Galum Crossing site (21C4-29). Limestone also was used in the manufacture of discoidals and large hoes recovered from a Late Woodland context at the Jamestown site (21C4-14).

Shale, used in the construction of these graves, may grade into fine sandstone or shaly limestones. The shale within the upper Galum Creek valley ranges from blue gray to black in color, with traces of the original bedding present. Shale was not commonly used on archaeological sites within the Burning Star Mine #4; however, it was used in association with limestone for the construction of graves at the Mississippian mortuary site (21C4-9), and graves constructed entirely of shale were found at a habitation site (21C4-34) in the project area.

Sandstone occurs in bedded formations in the upper reaches of Galum Creek near the Galum Crossing site (21C4-29) but has a limited distribution throughout the remainder of the mine area. Sandstone was used for the construction of metates, abraders, and hearthstones at the Bonnie Creek site, a Mississippian homestead contained within the mine (Wagner 1986a).

Limonite is an iron ore that occurs in stream beds and eroded bank cuts in the upper Galum Creek valley. Concretious limonite may also occur in sandstone. Limonite is a soft yellowish brown ore with a hard exterior rind. One source area was documented in the mine area in an eroded bank cut in the Bonnie Creek valley immediately adjacent to site 21C4-132.

The glacial redeposited chert type consists of small chert cobbles that were deposited by glacial activity in the stream beds and exposed drift deposits of the till plains. These cobbles are generally small and of variable quality. The color range includes white, brown, and gray. In the Northfield area, glacial chert cobbles can be collected from the beds of Bonnie, Galum, and Rock Fork creeks and as isolates on the landscape. This chert type was extensively utilized throughout prehistory in the upper Galum Creek valley but declines in popularity following the Middle Woodland period.

Igneous/metamorphic cobbles occur throughout the stream beds of the project area. They also occur as isolates on the landscape. Cobbles can also be collected from exposed bank cuts in the till plains, and one such source was documented in the upper reaches of Bonnie Creek immediately north of site 21C4-132 (Figure 3).

Previous Archaeological Investigations

A detailed history of archaeological investigations in southern Illinois has been presented in Haas and McNerney (1986), and the reader is referred to that report for a cultural overview of the region. A short summary of previous archaeological investigations within Burning Star Mine #4 since 1973 is presented below.

The initial work in the Burning Star Mine #4 consisted of an archaeological survey of the 2,430 acre Southfield area of the mine (Pulcher 1974a). Survey methods consisted of a combination of pedestrian survey of cultivated fields (295 acres) and interviews with artifact collectors and landowners. Wooded areas were inspected for mounds or other features but were not shovel tested. Twenty five sites were located by the survey, 23 of which were in cultivated fields. Evidence of Archaic, Middle Woodland, Late Woodland, and Mississippian occupations was found (Figure 5). Site size ranged from 1,925 to 15,750 square meters, indicating possible functional or occupational differences among the sites in the Galum Creek valley. Three Mississippian stone grave cemeteries and two possible Late Woodland burial mounds also were located. In addition to the Southfield, the surveyors also recorded sites in the area that would eventually become the Northfield of Burning Star Mine #4 (Pulcher 1974a:36-41). Twenty sites (including the Lightfoot site) were recorded on the basis of interviews and site visits along Bonnie, Galum, and Rock Fork creeks. Archaic, Late Woodland, and Mississippian occupations were identified, with one Mississippian stone grave cemetery (21C4-9) recorded.

Salvage excavations were conducted concurrently with the survey at two sites, Brune (21D3-9) and Burning Star (21C4-3), that were being destroyed by mining activities (Figure 5). These excavations revealed that the Brune site was multicomponent with two Late Woodland basins and six Mississippian features including a rectangular wall trench structure, at least four basins, and an extended burial in a limestone slab grave found within a 2,925 square meter area of the site. Local informants stated that 30 to 40 burials in stone graves had been present at the site at one time. Based on the presence of cordmarked shell-tempered ceramics and incised plates, the Mississippian occupation of the Brune site was suggested to date between A.D. 1250-1500 (McNerney 1974:53).

The Burning Star site (21C4-3) was located on a ridge top immediately east of Galum Creek and approximately 3,000 m southeast of the confluence of Bonnie, Galum, and Rock Fork creeks. The site had been almost entirely destroyed by strip mining, but excavation of the remaining portion recovered 49 late Woodland features including a pit structure, 10 human burials, and possible cooking and storage pits. A radiocarbon sample from one of the pit features returned a date of A.D. 750±220-250 (Pulcher 1974b:109). The ceramic assemblage consisted of jars, bowls, miniature vessels, and figurine fragments (Pulcher 1974b:78-87). Decorations included interior punched nodes, appliqued nodes, and interior and exterior notched rims. Projectile points/knives included shallow side-notched specimens similar to the Lowe Flared Base

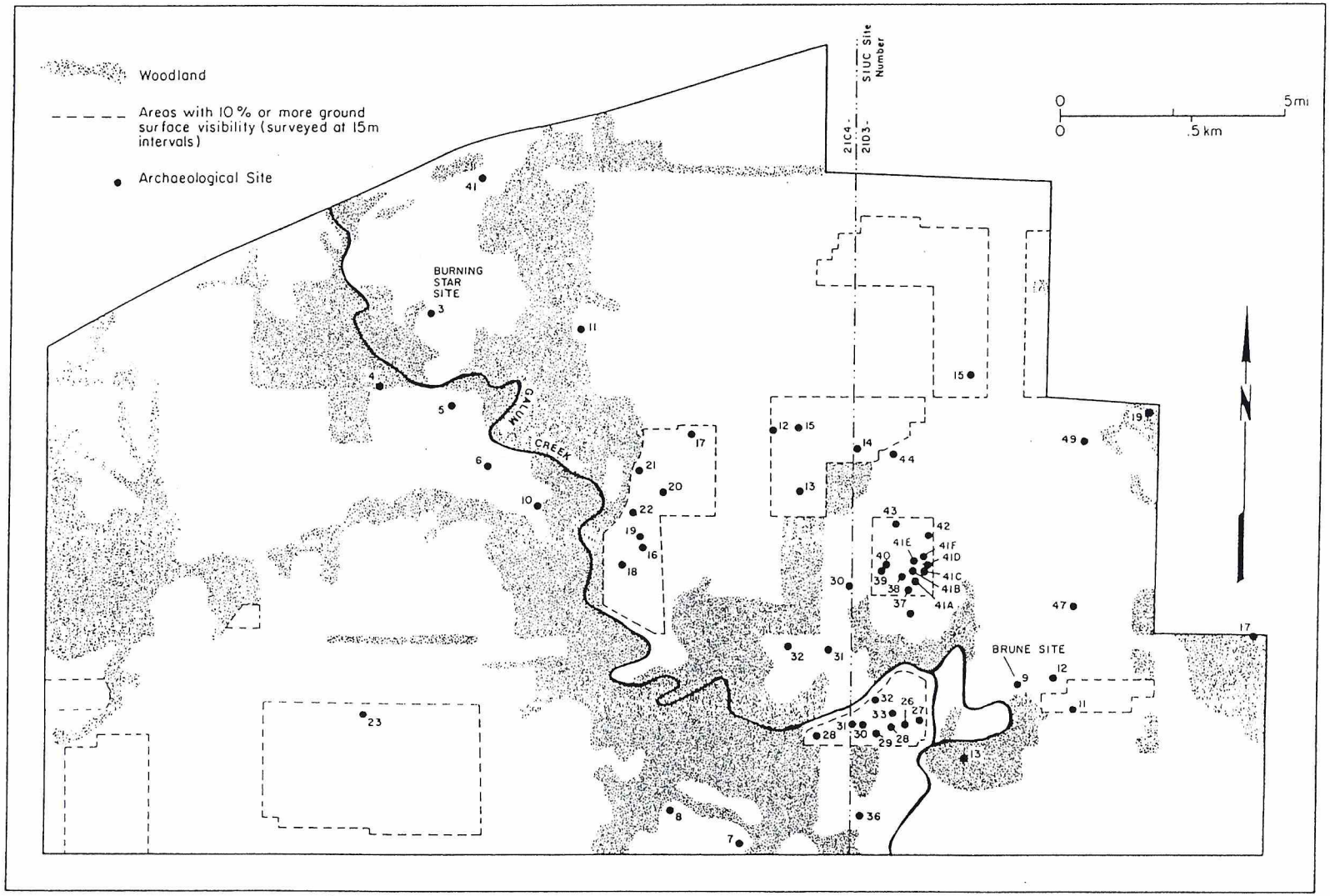


Figure 5. Distribution of archaeological sites, Southfield, Burning Star Mine #4 (adapted from McNerney 1974).

and Lewis artifact types and small arrow points manufactured on flakes (Pulcher 1974b:87). The faunal remains indicated a reliance on deer although other mammalian as well as avian and fish remains were recovered. The botanical remains indicated a reliance on nuts (Carya sp.) as opposed to seeds. Pulcher (1974b:108-109) interpreted the site as a fall-winter occupation on the basis of the recovered data but suggested that the site may have been occupied during the warm weather months as well.

The area north of the Burning Star Mine #4 that Pulcher (1974a) had partially surveyed later was acquired by the Consolidation Coal Company and incorporated into the mine as the Northfield. The Northfield measured approximately 5,000 acres (2,023 ha), was contained entirely within Perry County, and contained the confluence of Bonnie, Galum, and Rock Fork creeks. One hundred percent of this area was surveyed for archaeological sites in 1979 through a combination of pedestrian survey, shovel testing, and collector interviews (Figure 6). One hundred and seventeen archaeological sites ranging in date from the Archaic to the historic period were located (Haas and McNerney 1980). The highest prehistoric site density (5/km^2) occurred near the confluence of Bonnie, Galum, and Rock Fork creeks. Late Woodland sites occurred in the highest frequency (n=11) and density (.55 km^2), while Mississippian sites occurred in the same low frequency (n=3) and density (.15 km^2) as the Early Archaic sites. Most of the sites occurred in the slope woodland forest zone (72%), followed by prairie (9%), bottomland (8%), slope woodland/prairie (8%), post oak flats (2%), and bottomland/slope woodland (1.5%). Prehistoric occupations were characterized by light to moderate densities of chert and glacial cobbles. Only two sites, the Galum Crossing (21C4-29) and Jamestown (21C4-14) sites, exhibited organic staining and had heavy artifact densities. Test excavations were conducted at 13 prehistoric sites, with undisturbed deposits or midden found at 6 sites and subsurface features found at 2 sites (Haas and McNerney 1980:371).

A stratified random sample of 38 of the 100 prehistoric sites located by the survey were recommended for mitigation. Key cultural and environmental variables used to insure a representative sample included cultural affiliation, distance from the nearest perennial stream, and vegetational context within a 1 mi radius of the site (Haas and McNerney 1980:372).

Test excavations in the mine began in 1981. Because of mining schedules, these initial excavations were concentrated to the west of Jamestown Road as this area of the mine was scheduled to be mined first. Excavations in this area revealed the presence of a large Late Woodland and Mississippian occupation at the Galum Crossing site (21C4-29); intensive Archaic and Woodland utilization of ridge spur sites 21C4-60 and 21C4-129 as nut processing and hunting camps; the presence of an Archaic through Crab Orchard midden at site 21C4-27, a nut collecting and hunting camp on a rise in the floodplain; and the occurrence of a Woodland burial mound (21C4-122) and Mississippian stone grave cemetery (21C4-9) on the same ridge near the creek confluences at the southern end of the project area. Archaeological investigations began west of

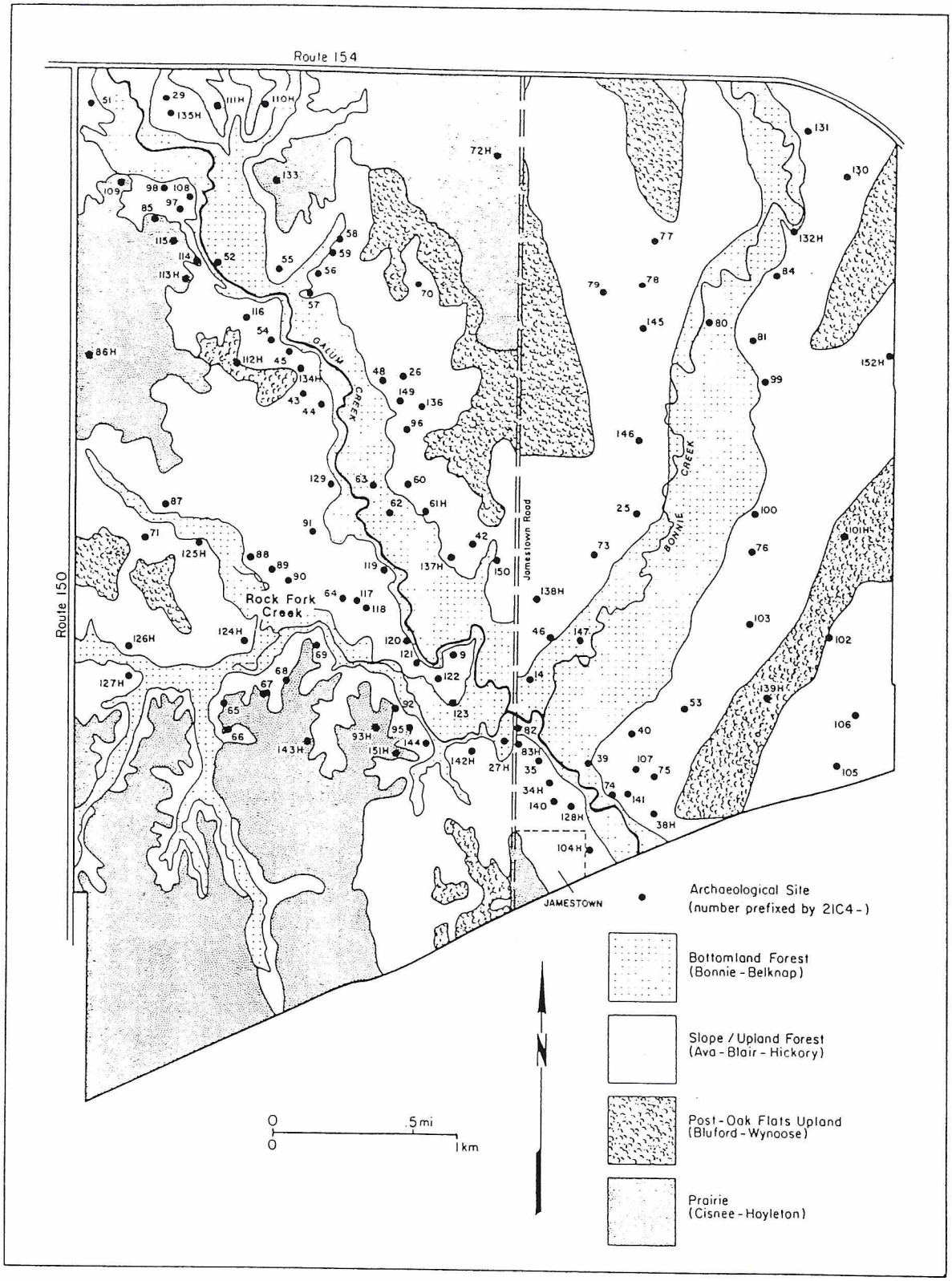


Figure 6. Distribution of archaeological sites, Northfield, Burning Star Mine #4 (adapted from Haas and McNerney 1986).

Jamestown Road in 1983. These revealed that a large, circular Late Woodland village containing over 500 pit features and at least 6 structures was located at the Jamestown site (21C4-14). The features and structures were clustered around a central open area, the center of which was marked by two large centerposts. Radiocarbon dates from the site indicate that it was occupied throughout the Late Woodland period but that the circular site pattern may date to approximately A.D. 600-800. Late Woodland occupations were also found at the Cutler (21C4-34) and Lightfoot (21C4-35) sites. The Late Woodland ceramics from these sites are similar to the Raymond and Dillinger ceramic types of southeastern Illinois. In a very general sense, the Late Woodland ceramic sequence at the Jamestown site is broadly similar to that recorded in the American Bottom and elsewhere in Illinois. Briefly stated, these similarities include the occurrence of noded vessels early in the sequence, the gradual replacement of nodes in favor of notched and cordwrapped stick impressed modifications to the vessel lip, and the appearance of shouldered jars and large shallow bowls and pans late in the tradition.

Mississippian occupations were found to be much more frequent than indicated by the original survey (Haas and McNerney 1980), which had reported that only three Mississippian sites (21C4-9, -14, and -46) were located within the mine. Additional Mississippian occupations including structures were found at sites 21C4-29, -34, and -35. The Mississippian ceramics and radiocarbon dates from these sites indicate that the Mississippian occupation of the area dates to approximately A.D. 1200-1400. Excavations at the Bonnie Creek site (21C4-46), a single component Mississippian homestead site, revealed that two structural complexes located to either side of a central area that contained smudge pits, cooking pits, and possible storage pits existed at the site. The site was interpreted as a year-round homestead with differences in structure morphology and size between the two structural complexes interpreted as indicating the possible presence of summer and winter houses at the site (Wagner 1986a:249-250). Although the project area represents only an arbitrary slice of the Galum Creek valley and may not encompass the entire range of prehistoric site types in the region, the information recovered by the excavations indicates that changes in settlement patterns and subsistence activities occur between the Late Woodland and Mississippian periods. During the Late Woodland period, the settlement pattern includes large sites such as the Jamestown (21C4-14), Galum Crossing (21C4-9), and probably the Burning Star (21C4-3) sites which contain large numbers of pit features, structures, and, in the case of the Jamestown site, organized community plans. These sites may represent permanently occupied base camps. Smaller Late Woodland sites (such as the Lightfoot site) that contain pit features and a limited amount of cultural debris are also part of the settlement system. Evidence of Meso-American cultigens was not found at these sites, with the collection of nut crops (Carya sp.) appearing to be of major importance. Faunal data from the Galum Crossing site (21C4-29) indicate that the Late Woodland Indians were exploiting a broad spectrum of fauna including aquatic, semiaquatic, and terrestrial species (Barr and Bloom n.d.) The Late Woodland occupation of the area ends with the construction of several Dillinger phase features at the Jamestown site.

In contrast to the Late Woodland settlement system which includes large, intensively occupied sites, Mississippian occupations in the area consist of dispersed communities comprised of one to three structures and associated pit features. Large sites with numerous structures, such as the Bridges site (Hargrave et al. 1983) in the Kaskaskia River valley, were not documented. Based on faunal, botanical, and other data, these small homesteads appear to be occupied on a year-round basis. Subsistence data indicates that the Meso-American triumvirate of maize, beans, and squash was cultivated, with native plant species being of minor importance. In contast to the generalized Late Woodland faunal exploitation pattern, faunal data from the Bonnie Creek site (21C4-46) indicate that Mississippian faunal exploitation activities involved a concentration on upland terrestrial species with minor utilization of the creeks and floodplains (Bloom 1986:223-224; Wagner 1986a:244).

Archaeological investigations in the Burning Star Mine #4 were completed in 1984 with the excavation of the Jamestown site. These investigations included the excavation of Archaic, Middle Woodland Crab Orchard, Late Woodland, Mississippian, and historic period Euro-American sites.

CHAPTER II. METHODOLOGY

Mark J. Wagner and Brad Koldehoff

Field Methodology

The archaeological investigations were performed using a combination of .25 m^2, 2 m^2, 4 m^2, and larger size excavation units. The .25 m^2 units were used to define the site limits as the initial part of the excavations. A 10 m grid system was superimposed over the site, and a test unit was excavated at the intersection of each 10 m grid line. Each test unit minimally measured .25 m^2 and was excavated at least 10 cm into the culturally sterile subsoil. The bottoms and sides of these units were troweled and all soil zones recorded. A distribution map showing the number and types of material from each shovel test was prepared in the field.

The methodology for the larger excavation units was essentially the same as that used for the smaller units, with some minor exceptions. All units initially were excavated in natural levels with the plow zone removed as a single level. The soil beneath the plow zone was excavated in arbitrary 10 cm levels. All soil from each level was screened through 1/2 in. mesh. A 25 cm x 25 cm x 10 cm deep soil block was left in the southwest corner of each unit. Ten liters of soil were removed from each of these blocks and saved for flotation to recover small botanical and faunal remains. The southwest corner of each unit was recorded in relation to the site datum, and all measurements within each unit were taken from these corners using a line level and a hand-held tape. This corner also was used as a designator for the entire unit, with each unit assigned an individual number. The floor of each unit was troweled and mapped at a 1:20 scale at the base of each level if soil staining was present. If no soil staining was present, a notation to that effect was entered on the unit form and no map prepared. All potential features were mapped and cross-sectioned at the base of the level at which they were defined. The profiles of all features were mapped at a 1:10 scale and photographed. One half of each feature was taken as a flotation sample. All feature fill remaining after the soil samples were taken was screened through 1/4 in. mesh.

The excavation methodology for the single Mississippian structure identified at the site differed from that of other cultural features (i.e., pits and post molds) due to the more complex nature of structures. All wall trenches to the structure were mapped and cross-sectioned along their wide axes to obtain profile views. All fill from within the structure depression in units 26 and 31 was kept separate

from the general level fill and screened through 1/4 in. mesh. Flotation samples were taken from both the structure depression and from the wall trenches.

The site plow zone was mechanically removed following the completion of hand excavations using a Case farm tractor with an attached toothless bucket. All possible features were shovel scraped and troweled to define their shape in plan view. Systematic shovel scraping of the clay subsoil to define additional cultural features was restricted to the top of the ridge in the area of the Mississippian and possible Late Woodland structures. Shovel scraping was not necessary over most of the site area as the tractor operator was able to cleanly remove the site overburden down to the clay subsoil. A map showing the location of all features was prepared using an alidade and plane table stationed over grid point N200E200.

Flotation Processing Methods

During and after the completion of the field work, flotation samples were manually processed in the Sparta city reservoir using the tub agitation method (Struever 1968). Plant materials were skimmed from the surface of the water within the tubs using a fine mesh scoop and cataloged as the light fraction. The residue in the bottom of the screen (primarily lithic, ceramic, and faunal material) was designated the heavy fraction. Both fractions were placed on separate pieces of newspaper to dry. After drying, the botanical material was separated into maize, nutshell, seeds, and wood charcoal categories, with the material in each of these categories counted and weighed. The heavy fraction also was separated into categories--faunal, lithic, and ceramic--counted and weighed, and forwarded to specialists for analysis. Six of the light fraction samples were forwarded to Dr. William Cremin of Western Michigan University for analysis (Cremin 1985). Following Dr. Cremin's analysis, it was decided to expand the sample size to include 30% of all flotation samples from the Late Woodland and Middle Woodland Crab Orchard feature types-- basins and deep pits--at the site. No Mississippian pit features were identified by the investigations. The additional botanical samples were analyzed by Candace Lutzow of American Resources Group, Ltd., who also authored the botanical analysis section of this report. Specific analytical procedures used by Ms. Lutzow are contained in the subsistence chapter of this report.

Laboratory Methodology

All recovered archaeological materials were initially processed at the American Resources Group, Ltd., field laboratory in Sparta, Illinois. Material was separated into general categories (lithics, ceramics, botanical, unmodified rock, etc.), each of which contained more specific subcategories based on physical criteria. For example, the lithic subcatgories were bifaces, unifaces, debitage, other worked stone, and other (unmodified rock). Each of the subcategories was comprised of specific tool types with the debitage subcategory, for

example, consisting of cores, primary and secondary flakes, interior flakes, angular shatter, and unidentified shatter. These tools were counted and weighed and the information recorded on a preliminary analysis sheet. Following the preliminary analysis, the material in each of the general categories was forwarded to specialists for more detailed analyses. If these specialists detected errors in the preliminary analysis in any of these categories, the preliminary analysis sheet was corrected. The primary purpose of the preliminary analysis sheet was to provide a listing of general artifact types that could be used to examine the cultural affiliation of the pit features at an early stage in the analysis.

Lithic Analysis Methods

Prior to the final analysis of the Lightfoot site lithics, all materials had been washed, labeled, and sorted into a set of basic tool and debris categories. Final analysis subjected all materials to source area, functional, and technological analyses.

Source Area Analysis. Chert types were identified on the basis of macroscopic characteristics (color, texture, inclusions, and form) with the assistance of a large chert type collection (Koldehoff 1986a). All chert types were quantified by weight to the nearest 0.5 g; descriptions of chert types are presented later in the report. Individual specimens too small to be accurately identified were placed in an indeterminate category along with specimens that were too ambiguous macroscopically to be typed.

It must be noted that most chert types that occur in Illinois and Missouri possess rather distinct macroscopic properties; however, a small percentage of many chert types exhibit a wide range of macroscopic characteristics which often overlap with the "typical" attributes of other chert types. During analysis, a problem of this nature was encountered in distinguishing Burlington chert from local glacial till cherts. This same problem has been encountered at other till plain sites (e.g., Billings 1983). The approach taken to this problem is discussed in Chapter V.

In addition to sourcing chert types, all groundstone tools and cracked rock were separated into raw material types such as igneous/metamorphic, sandstone, limestone, and limonite and were quantified by weight to the nearest 1.0 g.

Functional and Technological Analysis

Chipped Stone Tools. Chipped stone tools were separated into 10 categories, while debitage was separated into 9; both were quantified by count. Tools were identified on the basis of morphology and use wear. A 10x hand lens was used to examine edges and surfaces for traces of use polish and damage. Admittedly, this method is less accurate and precise than approaches which employ high magnification (e.g., Keeley 1980). Data derived from previous experiments in biface and flake tool production and use were also utilized in the analysis (Koldehoff 1985a).

A conservative approach to tool identification was taken due to the fact that many of the tools in the assemblage were simple flake tools, and a number of processes can create edge damage in addition to intentional use (e.g., trampling on living surfaces, spontaneous retouch during flake detachment, and trowel damage).

With regard to quantification of tools, individual specimens were placed in a category on the basis of their "apparent" primary function (e.g., generalized scraper) in order to record the total number of tools at the site. However, additional functions of each individual tool were also recorded to obtain a more precise measure of site activities. For example, if one flake had been used for both cutting and scraping tasks, both functions were recorded. Additional functions for certain tool types (bifaces, drills, and chert hammers) were not readily evident due to their formalized nature; thus, no attempt was made to record additional functions.

Tool and debitage categories are briefly described below, and each has specific implications for past human behavior. To enhance the description and interpretation of lithic industries, the chert types of certain tool and debitage categories (i.e., bifaces, microliths, hoe and adze resharpening flakes, cores, and formalized scrapers) were quantified by count and/or weight to the nearest 0.1 g.

Biface. A biface can be defined as a flake or cobble that has had multiple flakes removed from dorsal and ventral surfaces. Bilateral symmetry and a lenticular cross-section are common attributes; however, these attributes vary with the stages of production as do thickness and uniformity of the edge. Included in this category are all hafted and unhafted bifaces that function as projectile points and/or knives. This encompasses small, late prehistoric arrow points and larger darts and knives common in Archaic and Woodland assemblages. Hafted bifaces are highly formalized tools that were very portable and designed for maintenance and reuse. Archaic and Woodland specimens were especially designed for extended use and could be used to perform a variety of additional tasks, often with little or no modification.

Generalized Cutting Tool. Generalized cutting tool is defined as a flake tool or a portion of a flake tool edge used to perform a variety of cutting or sawing tasks. Use wear occurs on both sides of the edge due to the generally perpendicular direction at which the tool was used. Tool edges classified as generalized cutting usually possessed (1) a low edge angle; (2) a straight or slightly convex shape; and (3) retouching, when present, occurs on both sides of the edge.

Generalized Scraping Tool. Generalized scraping tool is defined as a flake tool or a portion of a flake tool edge used to perform a variety of scraping tasks. Tool edges classed as generalized scraping edges usually possessed (1) steep or high edge angles; (2) damage or polish on only one side of the edge; (3) edge shapes that were straight, slightly convex, or slightly concave; and (4) retouching, when present, occurs on only one face. Also quantified in this category are formalized scraping tools such as end scrapers.

Adze Flake and Fragment. Tools in this category are pieces of debitage or a tool fragment that exhibits traces of woodworking polish that develops on chert after extended use. Adze flakes and fragments are the direct result of adze maintenance and recycling. Woodworking polish is dull or matte in appearance and tends to develop on high points like flake ridges before developing on the bottom of the flake scars (Keeley 1980). It is possible that some chipped stone adzes have had ther bits prepared by grinding the working edge smooth.

Spokeshave/Notch. A spokeshave is a specialized scraping edge that was prepared by retouching the edge of a flake. Its concave scraping edge indicates that it was used to work convex surfaces.

Denticulate. This tool type is based solely on a specific edge morphology--a serrated or toothed edge. This edge was produced by removing a series of appropriately spaced flakes from the edge of a flake. Several different functions have been suggested for this tool type or tool edge, including working hide, sawing wood, scaling fish, or shredding plant fibers. Its actual function remains problematical.

Graver. A graver is a small, often slender point that could be used to groove or incise a wide variety of material such as bone, shell, wood, or pottery. Gravers are easily manufactured by retouching the edge of a flake. Graver points were found to occur singly or in combination with other functional edges.

Drill. A drill is a relatively slender biface used specifically for boring holes through a variety of materials. These formalized tools often possess haft modifications.

Chert Hammer. A chert hammer is an exhausted core or cobble which exhibits heavy battering or crushing resulting from the production of groundstone tools. However, these tools could have been used to hammer or pound a variety of materials.

Hoe Flake and Fragment. This is a piece of debitage or tool fragment that exhibits traces of usually high-gloss use polish that commonly develops on hoe blades. Hoe flakes and fragments are the direct result of hoe maintenance and recycling.

Debitage

Core. A core is any cobble or piece of chert from which one or more flakes have been removed but which has not been shaped into a tool or used for a task other than that of a nucleus from which flakes have been struck. Two types of cores were identified in the analysis: freehand and bipolar. Each type is described in Chapter V.

Decortication Flake. This is any flake or flake fragment that exhibits 50% or greater dorsal cortex and was not utilized as a tool.

Block Shatter. Block shatter is any angular or chunky fragment of chert that does not possess a platform or bulb of percussion. Angular fragments are usually the result of chert fracturing along inclusions or internal fracture planes caused by frost action or crustal deformation. Block shatter is also created when chert fractures as a result of burning (i.e., thermal shatter). Excluding burning, block shatter is most frequently produced during early biface reduction and in bipolar core reduction and is equivalent to Binford and Quimby's (1963:286) "primary shatter."

Flake Shatter. Flake shatter is any small (ca. 1.5 cm) fragment or splinter of chert that does not possess a platform or bulb of percussion and cannot be identified easily as a flake fragment. This debitage type is equivalent to Binford and Quimby's (1963:298) "secondary shatter," and it can be produced in any stage of a biface or core reduction sequence. However, it is generated in bipolar core reduction and late stage biface reduction most frequently. This category also encompasses small, thin fragments of thermal shatter.

Core Reduction Flake. This is any flake that was struck from an unprepared core and was not converted into a tool. These flakes cannot be separated from flakes detached from early stage bifaces. Their platforms are usually amorphous in shape and lack multiple facets or lipping.

Bladelet. This category contains linear flakes that are twice as long as they are wide and which show evidence of sequential removal from a prepared core.

Biface Reduction Flake. This is any flake that was detached from a biface in middle or late stage reduction and was not converted into a tool. These flakes have multiple flake scars on their dorsal surface and multifaceted platforms that are usually well grounded, lipped, and elliptical in shape.

Flake Fragments. All fragmentary flakes that could not be assigned to other categories were placed in this residual category.

Groundstone Tools. Groundstone tools were separated into nine categories and quantified by count and weight to the nearest 1.0 g. These categories include both formalized and expedient tools which possess specific implications for past human behavior. Formalized groundstone tools (e.g., celts) were manufactured by pecking and grinding an igneous/metamorphic cobble into a desired shape. Expedient tools are cobbles used to perform a particular task with little to no prior modification. Cobbles were often selected for a task due to preexisting attributes (e.g., flat surfaces). These simple tools included manos, metates, hammers, etc.

All groundstone tools were quantified by their "apparent" primary function to record the number of tools in the assemblage. However, to obtain a more precise measure of site activity, all functional surfaces and edges on expedient groundstone tools were recorded. For example,

one cobble could possess two grinding surfaces, an anvil depression, and edge battering.

Mano/Grinding Stone. This is a roughly hand-sized cobble with one or more smoothed grinding surfaces. These tools (or small grinding surfaces) are used in conjunction with large grinding surfaces (i.e., metate/grinding slab) in the processing of plant foods.

Metate/Grinding Slab. This is a large cobble or tabular block of rock with at least one large grinding surface. These surfaces are used in conjunction with smaller hand-held surfaces to process plant foods.

Hammer. A hammer is a cobble which shows evidences of battering and crushing resulting from intentional use as a percussor. Hammers were most likely used in flint working, processing of plant foods (e.g., shelling nuts), and other tasks that involved crushing and pounding.

Anvil. An anvil is a cobble that has been used as a base to rest materials while they were struck with a hammer. Surfaces that are interpreted as anvils possess shallow, coarse textured depressions with amorphous outlines. These depressions were created by resistant materials wedging out minute granules of rock, and their appearance is similar to that of a surface that has been pecked with a chert hammer. Consequently, anvil depressions are believed to have been formed primarily by lithic reduction activities (i.e., bipolar percussion).

Celt. A celt is an ungrooved axe blade bifacially ground on one end to form a working edge or bit. These tools were usually hafted in wooden handles and normally used for cutting and working wood.

Pitted Stone. This is a cobble with at least one smoothed depression measuring no greater than 4 cm. These small depressions differ from anvils in that they are smoother and frequently deeper. It is likely that these depressions were used to crack, crush, and/or grind small amounts of less resistant material such as seeds, nuts, and mineral pigments. Infrequently, anvil type damage and smooth pits occur at the same location on a cobble surface.

Slotted Abrader. This is a tool predominantly manufactured from sandstone and used to shape and sharpen tools. Slotted abraders possess at least one groove or slot and often occur in combination with flat surface abraders.

Flat Surface Abraders. This abrader is usually a tabular shaped piece of sandstone with flat or slightly concaved surfaces. Common functions were apparently shaping and sharpening bone, wood, and possibly shell tools and ornaments as well as preparing platforms in flint working.

Plummet. A plummet is a tear dropped shaped formalized ground stone tool which usually possesses a haft modifaction. Their function is problematical.

Cracked Rock. This category contains chunks and small fragments of rock (excluding chert) that were not culturally modified except for their highly fractured nature, which was apparently the result of repeated exposure to heat. These thermal fractured rocks are commonly interpreted as residue from the processing and preparation of foodstuffs. Cracked rock was divided into raw material types and quantified by weight to the nearest 1.0 g.

Ceramic Analysis

The goals of the ceramic analysis were to provide: (1) a description of all ceramic wares and their subtypes present at the site; (2) a comparison of the Lightfoot site ceramics with Late Woodland ceramic assemblages from sites in the project area and other parts of southern Illinois. Local comparisons were made using the ceramic assemblages from other Late Woodland sites in the project area. Regional comparisons were made by using the published accounts of the ceramic assemblages from the Mike Adamson site (RI-188) in the Rend Lake reservoir area; the Bridges and Kingfish sites in the Kaskaskia River valley; the Mund, Rosewood, and Leingang sites in the American Bottom; and the Raymond site in Jackson County, Illinois.

The ceramic assemblage was separated into three types on the basis of temper, color, and mean sherd thickness. These were: Crab Orchard, Late Woodland, and Mississippian. The Crab Orchard and Mississippian ceramic types were minority types (less than 1% of all ceramics at the site) that were recovered in small amounts from the site plow zone, as intrusive inclusions in the Late Woodland pit features, from one Middle Woodland Crab Orchard basin (feature 45), and the Mississippian structure wall trenches. These three types were divided into subtypes that encompass the entire range of surface treatments presently known for the Burning Star Mine #4 research area. These were:

Type 1: Crab Orchard
- 1a: Plain
- 1b: Cordmarked
- 1c: Fabric Impressed
- 1d: Residual

Type 2: Late Woodland
- 2a: Plain
- 2b: Cordmarked
- 2c: Residual

Type 3: Mississippian
- 3a: Plain
- 3b: Cordmarked
- 3c: Fabric Impressed
- 3d: Residual

In terms of the Middle Woodland Crab Orchard and Late Woodland ceramics, only the cordmarked and residual subtypes were present at the Lightfoot site. Mississippian ceramic subtypes consisted of the plain, cordmarked, and residual categories. The residual category consists of sherds that are too fragmentary or eroded to determine the original surface treatment.

One hundred percent of the ceramic assemblage from the site was examined as to temper. Temper initially was used to sort the ceramic assemblage into two types, grit/grog tempered and shell tempered. Temper was systematically observed in terms of materials (shell or grit/grog), but the size or amount of the temper particles in each sherd was not systematically recorded. As a rule, the Crab Orchard sherds contained coarser temper with grit particles of much larger size than the grit particles comprising the temper in the Late Woodland ceramics. Limestone tempering, a characteristic associated with earlier Mississippian ceramics in the American Bottom region of Illinois, was not present in the Mississippian ceramics. The grit/grog tempered ceramics were further separated into two temporally distinct types, Crab Orchard and Late Woodland, on the basis of a combination of color, thickness, and temper size. Crab Orchard ceramics are generally thick, have a distinct orange to buff exterior, and are densely tempered with large pieces of grit, chert, and grog. Surfaces are smoothed plain, cordmarked, or fabric marked. Late Woodland ceramics are thinner, have buff to black exteriors, and have cordmarked or plain exterior surfaces.

Vessel wall thicknesses were obtained by measuring all Late Woodland and Crab Orchard sherds with a diameter of 25 mm or greater from a pit feature context. Vessel wall thickness was determined on the basis of two measurements taken on the thinnest and thickest points of each sherd. Hand calipers accurate to 0.1 mm were used to obtain these measurements.

One hundred percent of the sherds from the site were examined to identify surface treatment. Surface treatment throughout the till plains is very simple, with only three surface treatments recognized: (1) cordmarking; (2) fabric marking; (3) smoothed/plain. Cordmarked, fabric marked, and smoothed surfaces occur on Crab Orchard vessels (Maxwell 1951; Stephens 1975); cordmarking on Late Woodland vessels (Holley n.d.); and cordmarking, fabric marking, and smoothed surfaces on Mississippian vessels. Decorations were restricted to the Mississippian assemblage and consisted of incised lines on plates.

Vessel Types. The ceramic assemblage was sorted into sherd types using the point of origin of the sherd on the vessel as a criterion. Four sherd types were defined: rims (vessel lip present); necks (decoration, recurvature, or part of the vessel shoulder present); body (thin undecorated sherds); and basal (thick sherds exhibiting abrasion or wear). Rim and neck sherds were used to define the ceramic vessel types contained within each wear type. The correct orientation for each rim was determined by placing the sherd against a horizontal surface and manipulating the sherd until the sherd was flush with the horizontal surface. The resultant rim profiles revealed that jars, bowls, plates,

and pans were present. The following criteria were used to define the vessel type present at the site:

Jars. These are defined as globular bodied vessels with incurved or recurved rims. Traditionally, the jar form is assumed to be at least two times higher than it is wide with the maximum diameter occurring below the vessel orifice. Recurved jars have a constricted neck that is smaller in diameter than the vessel orifice, which has a slightly flaring to flaring rim. On incurved jars, the maximum upper vessel diameter occurs at the neck/shoulder junction. The vessel walls steadily converge from this point with the minimum upper vessel diameter occurring at the vessel orifice, which has an inward curving rim.

Bowls and Pans. These vessel types are not as high as jars and achieve their maximum vessel diameter at the vessel orifice. Rounded bowls are defined as hemispherical in profile view while incurved bowls approximate 3/4 of a sphere and have an inward curving rim. Pans are very shallow, large diameter vessels. Because of the fragmentary nature of many of the ceramics from the site, it was often not possible to determine if the recovered rims were from a bowl or pan form.

CHAPTER III. FIELD INVESTIGATIONS

Mark J. Wagner and Mary R. McCorvie

The Lightfoot site was initially located by Pulcher (1974a). The site was revisited by an archaeological crew in 1979 as part of the survey of the Northfield extension of the Burning Star Mine #4 (Haas and McNerney 1980:156). The site was defined as a moderate scatter of ceramics, sandstone, and glacial cobbles and a heavy scatter of chert covering a 4,800 m^2 area in both forest and brush with 10% visibility. The artifact inventory consisted of one biface, six modified flakes, one rim sherd, two body sherds, one miscellaneous clay object, one modified stone, and three unmodified stones. The occupation was defined as Late Woodland Raymond or Dillinger (Haas and McNerney 1986:76). The site was included within the sample of 32 sites scheduled for mitigation, and Phase II test excavations were recommended (Haas and McNerney 1980:374-378).

Hand Excavations

Phase II excavations were conducted at the site in the late summer of 1983. At that time, the site was located in a fallow agricultural field with 0% ground surface visibility. A controlled surface collection was not conducted. Instead, the site limits were defined by systematically excavating twenty four 50 cm x 50 cm units across the ridge (Figure 7; Table 5). The excavations started at the east end of the field 10 m north of the site datum (N200E200) with units excavated every 10 m. In all, five north-south transects of units covering a maximum area of 90 m north-south by 40 m east-west were excavated parallel to the ridge edge. Cultural material was recovered from all 24 of the units. The artifact frequency ranged from 2 to 18 pieces per unit with a mean of 10.4 artifacts per unit. Three soil horizons were defined in the unit wall profiles: (1) a dark yellowish brown 10YR 3/4, 4/4, 4/3 silty clay plow zone that varied in depth from 18 to 28 cm bs. This level contained the majority of the cultural material found in the units (Table 5). Culturally diagnostic material from within the plow zone consisted of 25 Late Woodland sherds, 4 Crab Orchard sherds, and 2 Mississippian sherds; (2) a 10YR 3/4, 4/4 dark yellowish brown silty clay subplow zone horizon defined in eight units (1-4, 6, 8, 17, 24) that varied in depth from 8 to 26 cm beneath the surface. This horizon contained prehistoric cultural material and, in that sense, can be defined as a prehistoric midden. However, it was only slightly darker and very similar in texture to the culturally sterile clay subsoil. A Crab Orchard sherd in unit 20 was the single culturally diagnostic item

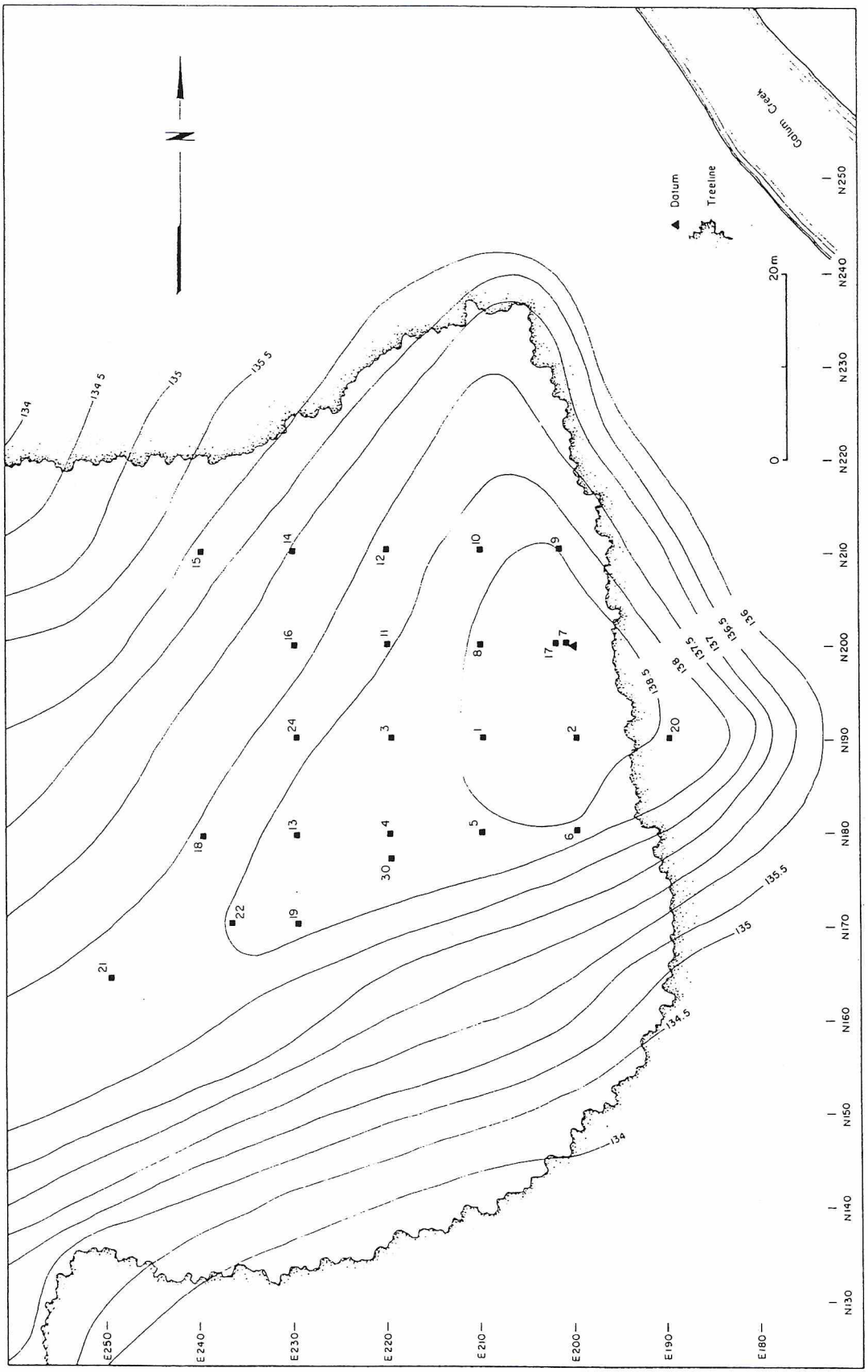


Figure 7. .25 m2 test unit distribution.

Table 5. Material Frequencies, .25 m^2 Units.

Unit	Chert Debitage	Chert Tools	Ground Stone	Rock	Ceramics: Crab Orchard	Ceramics: Late Woodland	Ceramics: Miss.	Tot.	(%)
1 (N190E210)	2	1		4		2		9	(3.9)
2 (N190E200)	2	4		7		1		14	(4.4)
3 (N190E220)	4	2		10	1	1		18	(7.9)
4 (N180E220)	4	1		8		1		14	(4.4)
5 (N180E210)	1	2		7	1	1	2	14	(4.4)
6 (N180E200)	2	1	1	12		2		18	(7.9)
7 (N200E201)				3				3	(1.3)
8 (N200E210)	1	2		4				7	(3.0)
9 (N210E201.5)	3	1		4				8	(3.5)
10 (N210E210)	5	1		5		1		12	(5.2)
11 (N200E220)	1	1		4		1		7	(3.0)
12 (N210E220			1	1				2	(0.9)
13 (N180E230)				3				3	(1.3)
14 (N210E230)	2			1		4		7	(3.0)
15 (N210E240)				5				5	(2.2)
16 (N200E230)			1	9		4		14	(4.4)
17 (N200E202)				3				3	(1.3)
18 (N180E240)			1	9		1		11	(4.8)
19 (N170E230)	4			4				8	(3.5)
20 (N190E190)	1			11	1	1		14	(4.4)
21 (N165E250)				2				2	(0.9)
22 (N170E240)	7			9				16	(6.9)
24 (N190E230)				2				2	(0.9)
30 (N177E220)				18				18	(7.9)
Total	39	16	4	145	3	20	2	229	
%	17.0	7.0	1.7	63.3	1.3	8.7	0.9		

recovered from this horizon; and (3) a culturally sterile 10YR 5/5 yellowish brown clay subsoil that originated at the base of the subplow zone cultural horizon in eight units or at the base of the plow zone in the remainder of the units at a depth of from 12 to 25 cm beneath the surface.

Six 4 m^2 units and one 1 m x 2 m unit were excavated at the site to obtain more information regarding the subplow zone cultural horizons (Figure 8; Table 6). The area of the site in which the possible midden was located was divided into 10 m x 10 m blocks with one 4 m^2 unit excavated within each block. Excavation of these larger units provided an approximate 3.7% sample of that area of the site containing the possible midden. A subplow zone cultural horizon extending to 60 cm beneath the surface was found in unit 23 and to 50 cm bs in units 2, 28, and 29. In addition, cultural material was recovered from up to 30 cm beneath the surface from subplow zone contexts in units 25, 26, 27, and

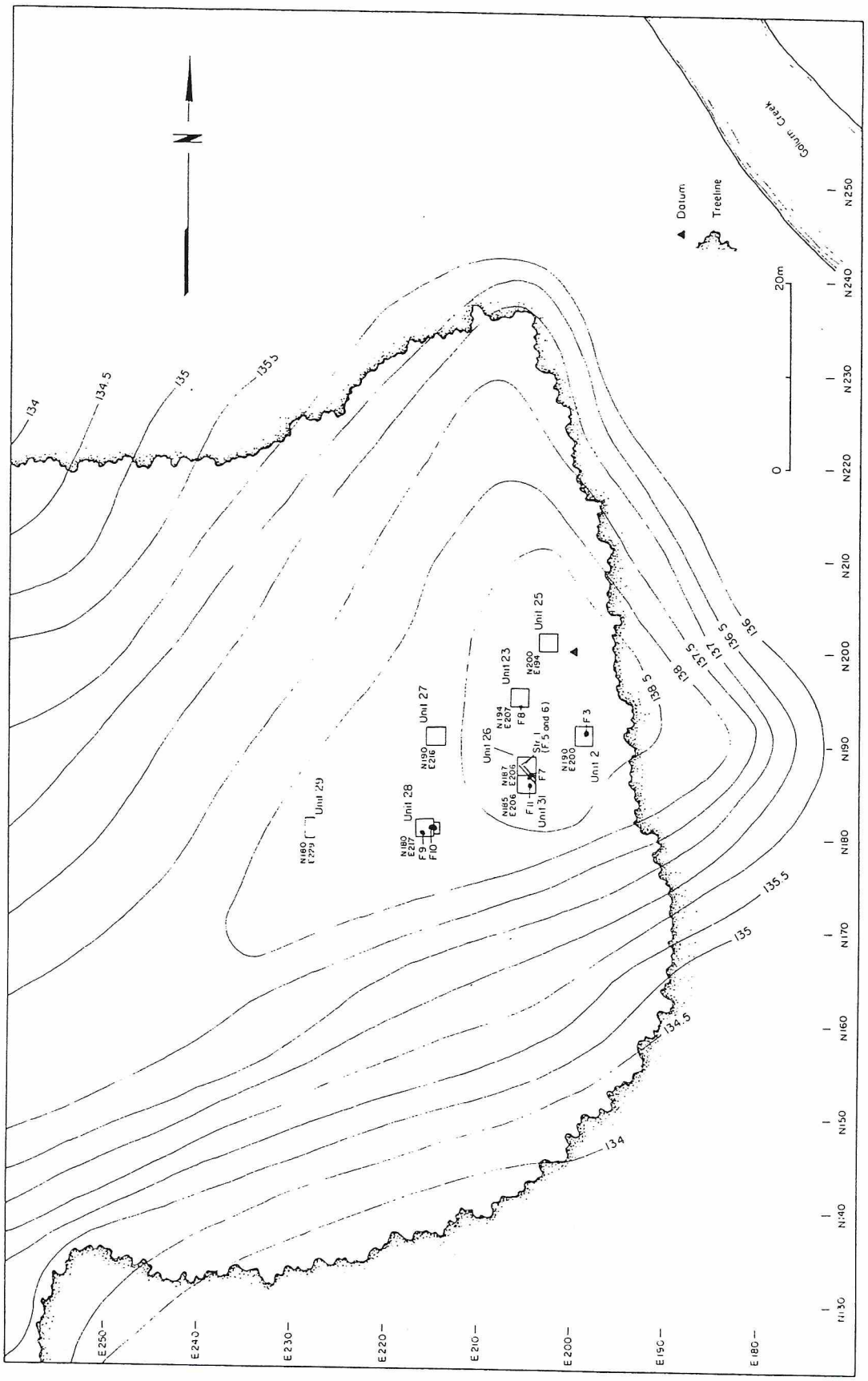


Figure 8. Location of large excavation units.

Table 6. Material Frequencies, Large Units.

Unit	Chert Debitage	Chert Tools	Ground Stone	Rock	--Ceramics-- CO	LW	MISS	Fauna	Total (%)
23									
Plow Zone	26	14	1	94	-	24	8	-	167 (9.1)
Level 3	9	4	-	28	1	7	1	-	50 (2.7)
Level 4	18	4	2	94	3	14	2	1	138 (7.5)
Level 5	4	1	-	15	1	-	-	-	21 (1.1)
25									
Plow Zone	30	17	1	79	-	51	-	-	178 (9.7)
Level 3	-	-	-	14	-	-	-	-	14 (0.8)
26									
Plow Zone	47	14	2	129	5	27	7	-	231 (12.9)
Level 3	18	3	-	42	-	17	5	-	85 (4.6)
27									
Plow Zone	33	8	1	86	1	29	-	-	158 (8.6)
Level 3	-	-	-	8	-	7	-	-	15 (0.8)
28									
Plow Zone	26	8	2	162	4	42	-	1	245 (13.3)
Level 3	12	1	1	18	-	2	-	-	34 (1.9)
Level 4	-	-	-	3	-	1	1	-	5 (0.3)
29									
Plow Zone	13	2	-	37	-	5	3	-	60 (3.3)
Level 3	5	4	1	16	-	1	-	-	27 (1.5)
31									
Plow Zone	29	15	3	93	8	27	11	-	186 (10.1)
Level 3	7	3	1	26	-	1	-	-	38 (2.1)
32									
Plow Zone	20	10	4	103	1	37	-	-	175 (9.5)
Level 3	3	-	-	6	-	-	-	-	9 (0.5)
Level 4	1	-	-	1	-	-	-	-	2 (0.1)
Total	301	108	19	1054	24	292	38	2	1838
%	16.4	5.9	1.0	57.3	1.3	15.9	2.1	0.1	

31. This subplow zone horizon consisted of an undifferentiated dark yellowish brown silty clay that became increasingly clayey with depth. Charcoal flecks, burned clay, and burned bone flecks were present within this horizon as very minor inclusions. Culturally diagnostic material from within the horizon indicated that it primarily had a Late Woodland affiliation, with 37 Late Woodland sherds recovered in contrast to 1 Mississippian and 5 Crab Orchard sherds. The lowest level of the horizon

may have begun to form during the Middle Woodland period as a single Crab Orchard sherd was recovered from level 5 (40-50 cm bs) of unit 23 (Table 6).

Prehistoric cultural features were found at the base of the plow zone in five of the units (2, 23, 28, 30, 31). These features were located in units along the northern and eastern site boundaries (Figure 8). Information regarding these features is summarized later in this chapter; only a brief description is provided here. Three of the features (1, 3, and 4) were determined to be of natural origin and are not discussed further or shown on the site map. Of the remaining features, feature 2 was located in a unit on the edge of the treeline (unit 2) and was badly disturbed by tree roots. The feature appeared to be circular in plan view but was very indistinct in profile with a maximum depth of only 20 cm. Cultural material from within the feature consisted of Late Woodland sherds, lithic debitage, burned clay, and sandstone and igneous/metamorphic rock fragments.

Features 5 and 6 were two parallel Mississippian wall trenches located in unit 30 in association with a dark stain (feature 7) initially interpreted as a possible house basin. Expansion of the unit to 8 m^2 by the addition of a 4 m^2 unit (unit 31) revealed that feature 7 was in actuality a Late Woodland circular basin intersected by the two wall trenches. Cultural material within feature 7 included Late Woodland ceramics, lithic debitage, and burned clay. The two wall trenches (features 5 and 6) were filled with a 10YR 4/3 redeposited midden with burned clay, charcoal, and burned bone flecks present as minor inclusions. The two trenches were separated by 10 to 14 cm with both trenches extending out of the east side of the unit. Posts, structure depressions, or other Mississippian features were not found in association with the wall trenches. The two trenches were assigned a structure designation (structure 1). As the structure lacked a house basin or any internal features, it was decided to complete excavation of the structure following the mechanical removal of the site plow zone.

Feature 8 was a small, circular, flat bottomed feature with slanting walls located in the south wall of unit 23 (Figure 8). The feature may represent a burned post as a concentration of burned clay was found at the base of the feature. Feature 8 measured 10 cm in diameter with a depth of 6 cm. Cultural material was not recovered.

Feature 9 was an oval, deep, flat bottomed pit located in unit 28 (Figure 8). The feature measured 82 cm north-south by 40 cm east-west with a maximum depth of 37 cm. The feature contained a very clayey 10YR 3/4, 4/4 dark yellowish brown fill that was very similar in texture to and only slightly darker than the clay matrix. Burned clay, charcoal flecks, and burned nut fragments were present as inclusions within the fill, but there was no evidence of in place burning. Archaic period projectile points were recovered during the mechanical stripping, and the possibility exists that feature 9 could be an Archaic feature. However, the feature contained no culturally diagnostic material and its exact cultural association is unknown.

Feature 10 was a shallow, oval basin in unit 28 that may represent a prehistoric cooking pit or hearth (Figure 8). Over 1 kg of burned limestone was recovered from the feature in association with burned clay and charcoal. Two Late Woodland sherds were recovered from the feature.

Feature 11 was a Late Woodland circular basin located in unit 31 (Figure 8). The feature measured 65 cm in diameter by 18 cm deep. Feature 11 contained a 10YR 3/3 dark brown silty clay with charcoal and burned bone flecks lightly scattered throughout. Other material consisted of three fragments each of sandstone and igneous/metamorphic rock. Feature function was indeterminate.

The distribution of all culturally diagnostic ceramics from both the .25 m^2 and larger units was examined to determine if differences existed in the spatial distribution of these materials. Culturally diagnostic ceramics from the units consisted of Middle Woodland Crab Orchard (n=27), Late Woodland (n=312), and Mississippian (n=40) sherds. The Crab Orchard ceramics were found to be restricted to the eastern and southern site margins occurring in nine units (2, 3, 5, 20, 23, 26, 27, 28, and 31) with a maximum areal distribution of approximately 30 m north-south by 40 m east-west (1,200 m^2) (Figure 9). After adjusting for the variance in size between the units, ceramic frequency for these units varied from 1 to 8 sherds, with a mean of 2.09 sherds per 1 m^2. Three units (3, 5, and 20) had sherd frequencies greater than one standard deviation above the mean, but given the small sample size (n=27), this indication of variance within the population is probably not significant.

Late Woodland ceramics were the most frequently occurring (n=312) and had the widest spatial distribution of the three ceramic types, occurring in 19 units (1-6, 10, 11, 14, 16, 18, 20, 23, 25-29, and 31) with a maximum aeral distribution of 50 m north-south by 30 m east-west (1,500 m^2) (Figure 10). Sherd frequency in the units containing ceramics varied from 1 to 54 with a mean of 5.38 sherds per 1 m^2. Of the larger units (2, 23, 25, 26, 27, 28, 29 and 31) placed to test the possible midden, all had ceramic frequencies greater than one standard deviation above the mean with the exception of unit 31 (which was within one standard deviation below the mean) and unit 29 (which was greater than one standard deviation below the mean). None of the small test units had a ceramic frequency greater than one standard deviation above the mean. Assuming these data are correct, they indicate that although Late Woodland ceramics were distributed across the site, they were most frequent in the units located in the highest elevation area of the site above the 138.50 ft contour line.

Mississippian ceramics (n=40) occurred only in units 5, 23, 26, 28, 29, and 31 (Figure 11). These ceramics were distributed in an arc along the southern and eastern site margins with an approximate spatial distribution of 30 m x 30 m (900 m^2). Mississippian ceramics were confined almost entirely to the plow zone, with only a single sherd recovered from a subplow zone context.

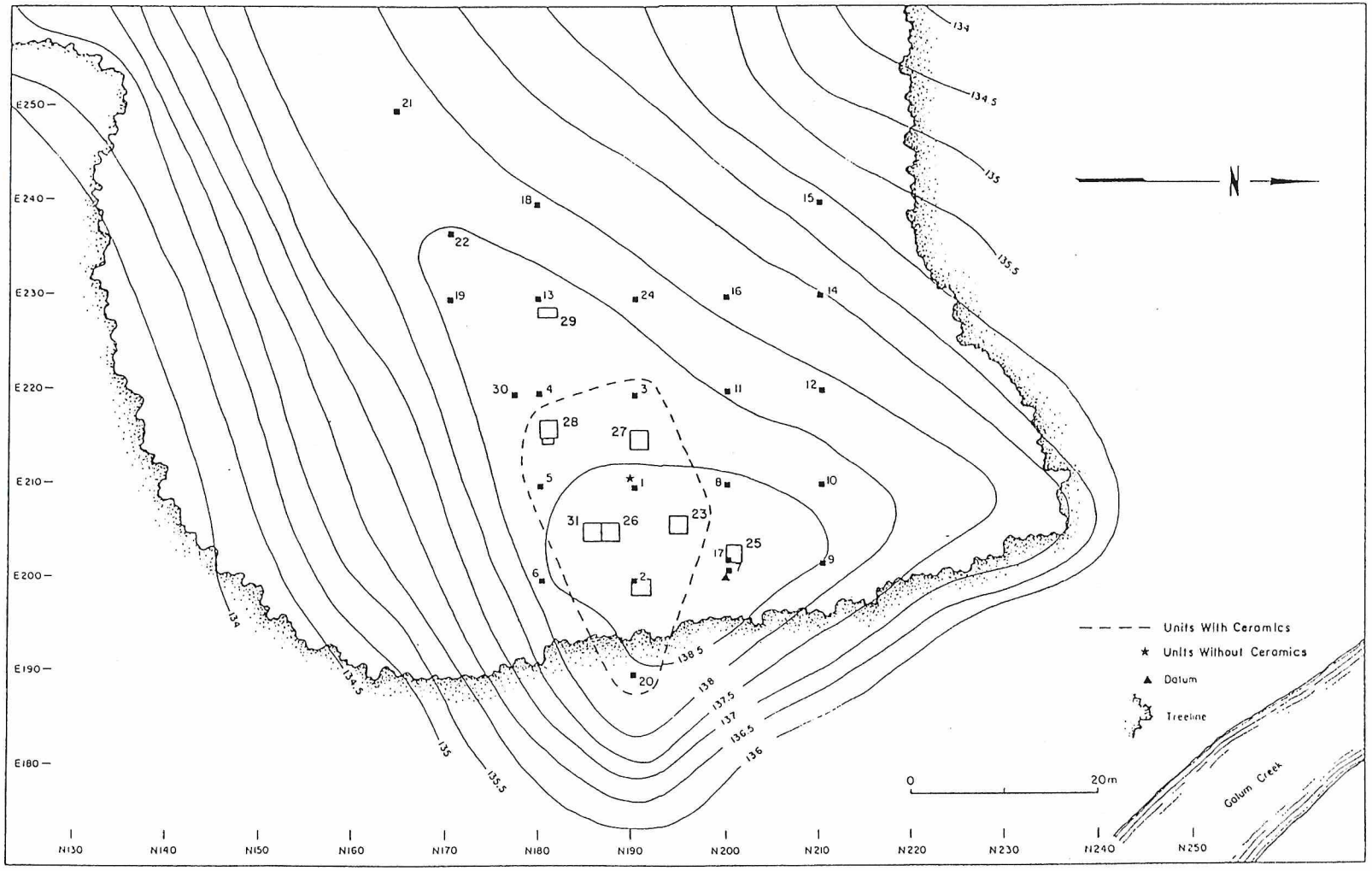


Figure 9. Distribution by excavation unit of Crab Orchard ceramics.

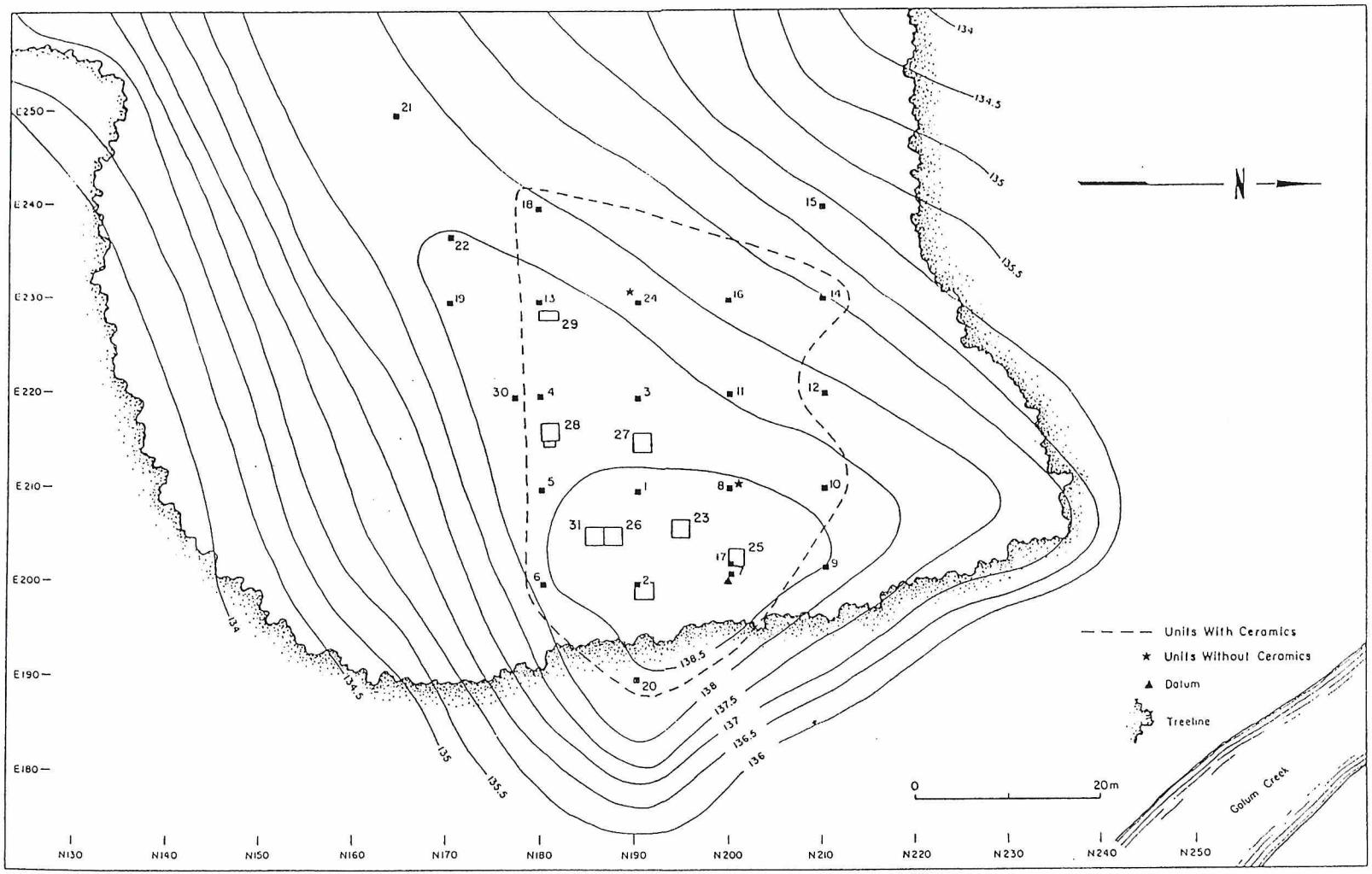


Figure 10. Distribution by excavation unit of Late Woodland ceramics.

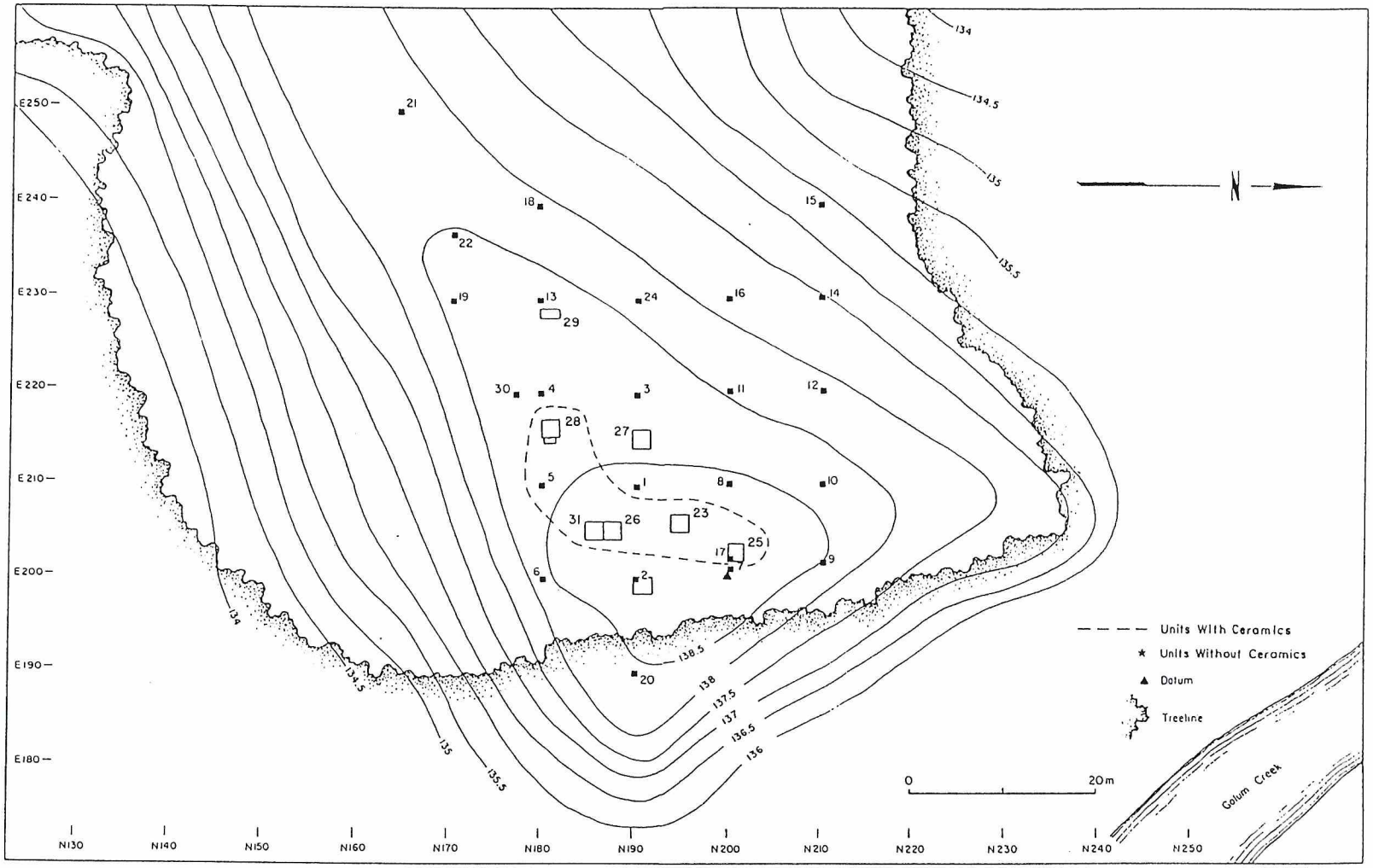


Figure 11. Distribution by excavation unit of Mississippian ceramics.

In sum, the controlled excavations revealed that: (1) the site covered approximately 1,200 m^2 of the ridge spur; (2) the site was multicomponent with Middle Woodland Crab Orchard, Late Woodland, and Mississippian occupations present; (3) a subplow zone cultural horizon with a maximum depth of 60 cm bs existed at the site. Based on the frequency of Late Woodland ceramics, this horizon primarily was associated with the Late Woodland occupation; (4) that Late Woodland, Mississippian, and features of unknown cultural affiliation were located at the base of the plow zone; (5) based on ceramic frequency, the main occupation of the site occurred during the Late Woodland period with 82.3% (n=312) of all ceramics being grit-tempered Late Woodland ceramics, 10.6% (n=40) being Mississippian, and 7.1% (n=27) Crab Orchard.

Based on the above data, it was believed that the Lightfoot site had the potential to provide information regarding Late Woodland activities in a small site setting in the project area, and mechanical excavations at the site were scheduled for 1984. Specific research problems that could be examined through excavations at the site included:

1. The role of these smaller Late Woodland sites in the local settlement system and how they related to the larger Late Woodland sites in the area such as the Jamestown site (21C4-14). Based on a controlled surface collection and test excavations, it was known that the Jamestown site exhibited an organized community plan with pit features distributed in a circular pattern around the perimeter of a rise in the creek floodplain with the site center being devoid of pit features. The organized community plan of the Jamestown site suggested that the site was permanently occupied, and the site center was maintained as a courtyard or plaza. Smaller Late Woodland sites such as the Lightfoot could represent short-term camps that were occupied on a seasonal basis to carry out activities such as nut collecting or hunting. If this was the case, the lithic tool assemblage from the Late Woodland features at the Lightfoot site should be comprised of a restricted number of tool types and not exhibit the full range of tool types expected of a semipermanently or permanently occupied site such as the Jamestown site. A variance in subsurface pit feature types should also occur with certain feature types such as structures, deep storage pits, and graves not being present or occurring as minority types.

2. The delineation of lithic tool types, ceramic vessel types, and ceramic attributes associated with early Late Woodland occupations in the upper Galum Creek valley. Based on the recovery of coarsely cordmarked noded ceramics from the test units (and the absence of later Late Woodland ceramic attributes such as folded rims), the Late Woodland occupation at the Lightfoot site appeared to date to the early Late Woodland period. No radiocarbon dates had been obtained from the site that would indicate that it dated to the early Late Woodland period, but Late Woodland ceramics with interior punched nodes as a decorative attribute are associated with the Rosewood (A.D. 300-450) and Mund (A.D. 450-600) Late Woodland phases in the American Bottom region of Illinois (Kelly et al. 1984:104-127). It was assumed that while the Late Woodland period phases defined for the American Bottom undoubtedly do not apply

exactly to the upper Galum Creek valley, certain general trends within these phases, such as changes in vessel shape and ceramic attributes, probably were characteristic to some extent of Late Woodland occupations in other parts of southern Illinois.

Mechanical Excavations

The plow zone was removed from the Lightfoot site in the spring of 1984 using a Case farm tractor with an attached toothless bucket (Figure 12). The stripped area measured approximately 40 m east-west by 36 m north-south with a projection to the southwest for a total area of approximately 1,600 m^2. The borders of the stripped area were formed by the treeline on the ridge spur edge on the east side of the site, by sharp drops in elevation to the north and south, and by an absence of cultural features to the west. The tractor operator was able to cut a clean enough surface that features were readily definable, and shovel scraping was unnecessary except for an approximate 18 m north-south by 7.5 m east-west area (135 m^2) along the eastern site margin (Figure 13). The mechanical excavations revealed that the Lightfoot site contained a total of 62 pit features including 35 features containing Late Woodland ceramics, 1 Middle Woodland Crab Orchard basin, and 26 aceramic features (Figure 13). Mississippian pit features were not found, although a possible smudge pit (feature 65) which contained no culturally diagnostic material could have been Mississippian. Of the aceramic features (9, 14, 17, 18, 21, 23, 26, 29, 36, 37, 38, 43, 44, 50, 51, 52, 53, 55, 59 60, 65, 68, 71-74), most, if not all, are probably associated with the Late Woodland occupation. Many of these features were located on the site slopes and were very shallow as the result of plowing and erosion. Although these features were distinct in plan view, they proved to be quite shallow when profiled, ranging in depth from 1 to 18 cm with a mean depth of 8.6 cm. The lack of ceramics in most of these features is undoubtedly a reflection of the shallowness of the features. In addition to the pit features, a possible Late Woodland post structure (structure 2) and a rectangular Mississippian wall trench structure (structure 1) were located adjacent to each other in the highest elevation area of the site along the eastern site margin (Figure 13).

The Late Woodland features were evenly distributed across the site with no distinct clustering (Figure 13). A slight gap of several meters separated the features located above the 138.50 ft contour from those within the 138.0 and 138.50 ft contour intervals. Given the shallowness of the majority of the pit features at the site, this gap could have been created by the removal of very shallow pit features by plowing or the mechanical stripping.

Structure Descriptions

Two structures containing a total of three building episodes were defined at the Lightfoot site (Figure 13). Structure 1 was a Mississippian wall trench structure located on the eastern site margin

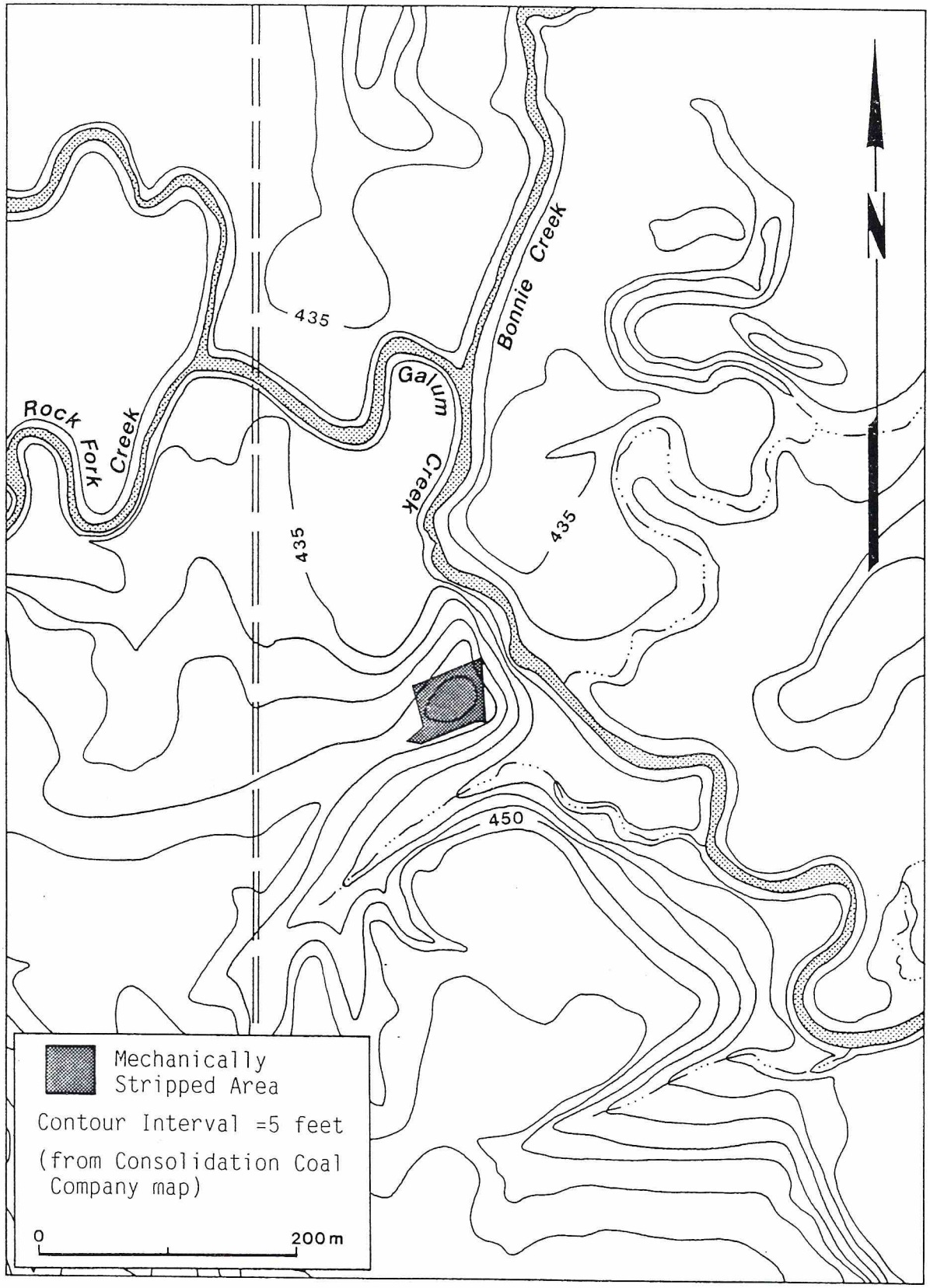


Figure 12. Mechanically stripped area, the Lightfoot site.

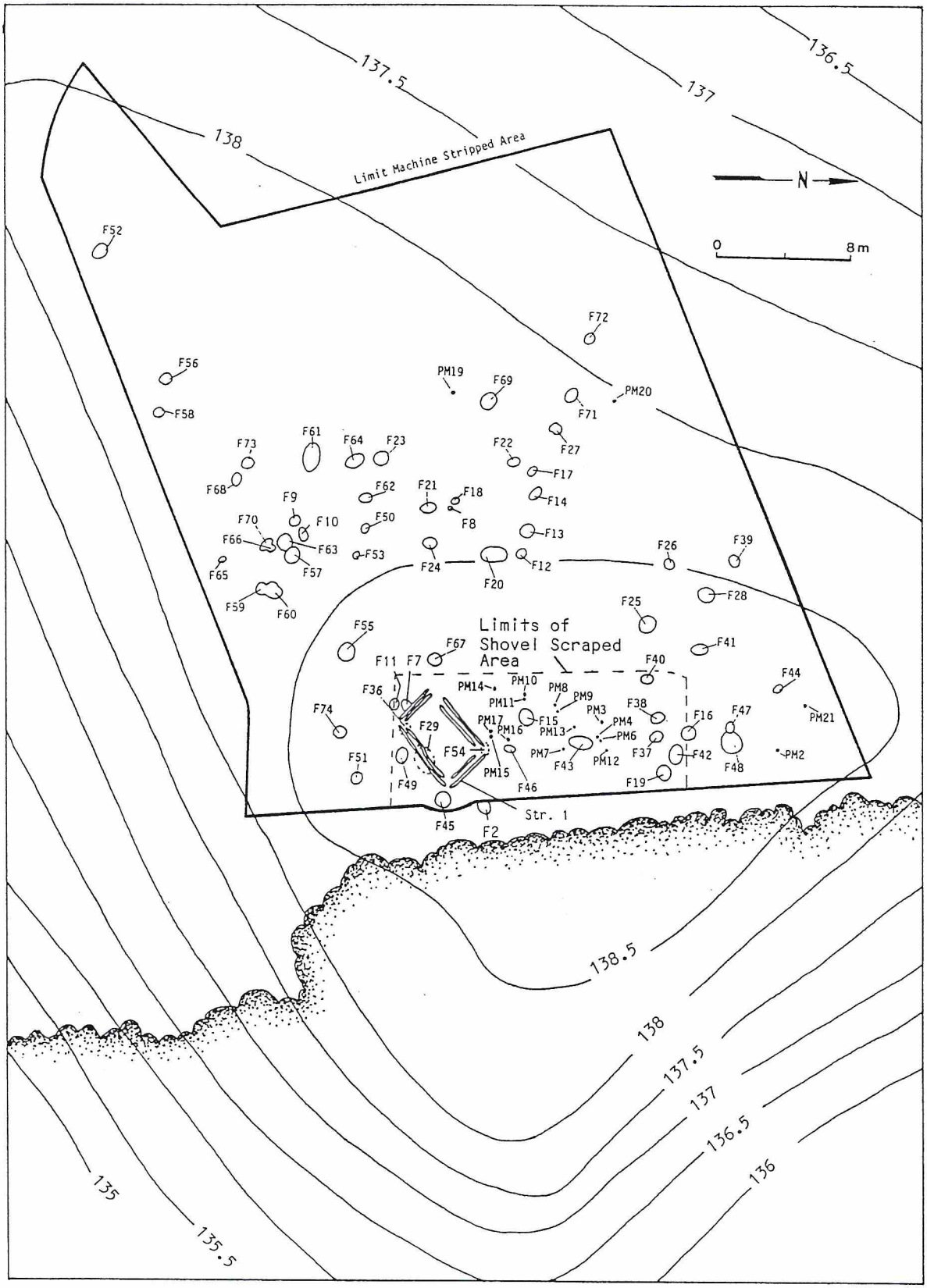


Figure 13. Site plan.

that consisted of two building episodes (structures 1a and 1b) (Figure 14). Structure 2 was located to the east of structure 1 and consisted of 15 post molds that may represent the remains of a Late Woodland post structure.

Structure 1

Structure 1 was located initially during the controlled excavations when a 4 m^2 unit (unit 26) intersected the northwest wall trenches (features 5 and 6) of the structure at the base of the plow zone at 18 cm beneath the surface (Figure 8). A large, dark stain (feature 7) located along the south wall of the structure initially was believed to represent the remains of a structure basin. Expansion of the unit to the south, however, revealed that feature 7 was in actuality a Late Woodland pit intersected by the wall trenches of the Mississippian structure. Profiles of features 5 and 6 revealed that they were shallow (24 cm), narrow, flat bottomed trenches (Tables 7 and 8). Both trenches measured 15 cm wide at the base of the plow zone, tapering to 6 cm wide at their base.

The shallowness of the wall trenches and the lack of a structure basin indicated that the structure had largely been destroyed by farming and erosion. Hand excavation of additional units above the structure would recover little additional information regarding the structure. As a result, it was decided to mechanically remove the remainder of the overburden above the structure. The plow zone overburden covering the rest of structure 1 was removed during the mechanical stripping of the site in early May 1984. Structure 1 appeared as a rectangular wall trench structure with a double set of wall trenches on all four sides. No structure basin, post molds, or internal features were associated with the structure. All four corners of the structure were open, with no post molds located within the structure corners. The interior structure (structure 1a) was oriented northeast-southwest with a maximum interior floor area of 5.05 m by 2.80 m (14.14 m^2) (Table 8). The maximum size of structure 1a (measuring to the outside of the wall trenches) was 5.35 m by 3.05 m (16.31 m^2). The floor area of structure 1b measured 5.35 m by 3.60 m (19.26 m^2) with exterior dimensions of 5.575 m by 3.80 m (21.18 m^2). The northeastern (feature 34), northwestern (features 32 and 33), and southeastern (features 29 and 30) wall trenches of the two structures were cross-sectioned to obtain a profile view of their construction (Figure 14). All of the trenches were shallow, straight sided, and round to flat bottomed with the exception of feature 31, which had one straight and one slanting side. The only cultural material recovered from structure 1 consisted of a hoe flake and lithic debitage contained within the wall trenches.

The temporal placement of the Mississippian occupation at the Lightfoot site cannot be definitely established but has been suggested to be contemporary with the ca. A.D. 1200-1450 Mississippian occupations documented at other sites in the mine (Wagner 1986a:140-142; 251-254). Comparison of structure 1 to the structures at these other sites indicates some differences in terms of construction and presence of

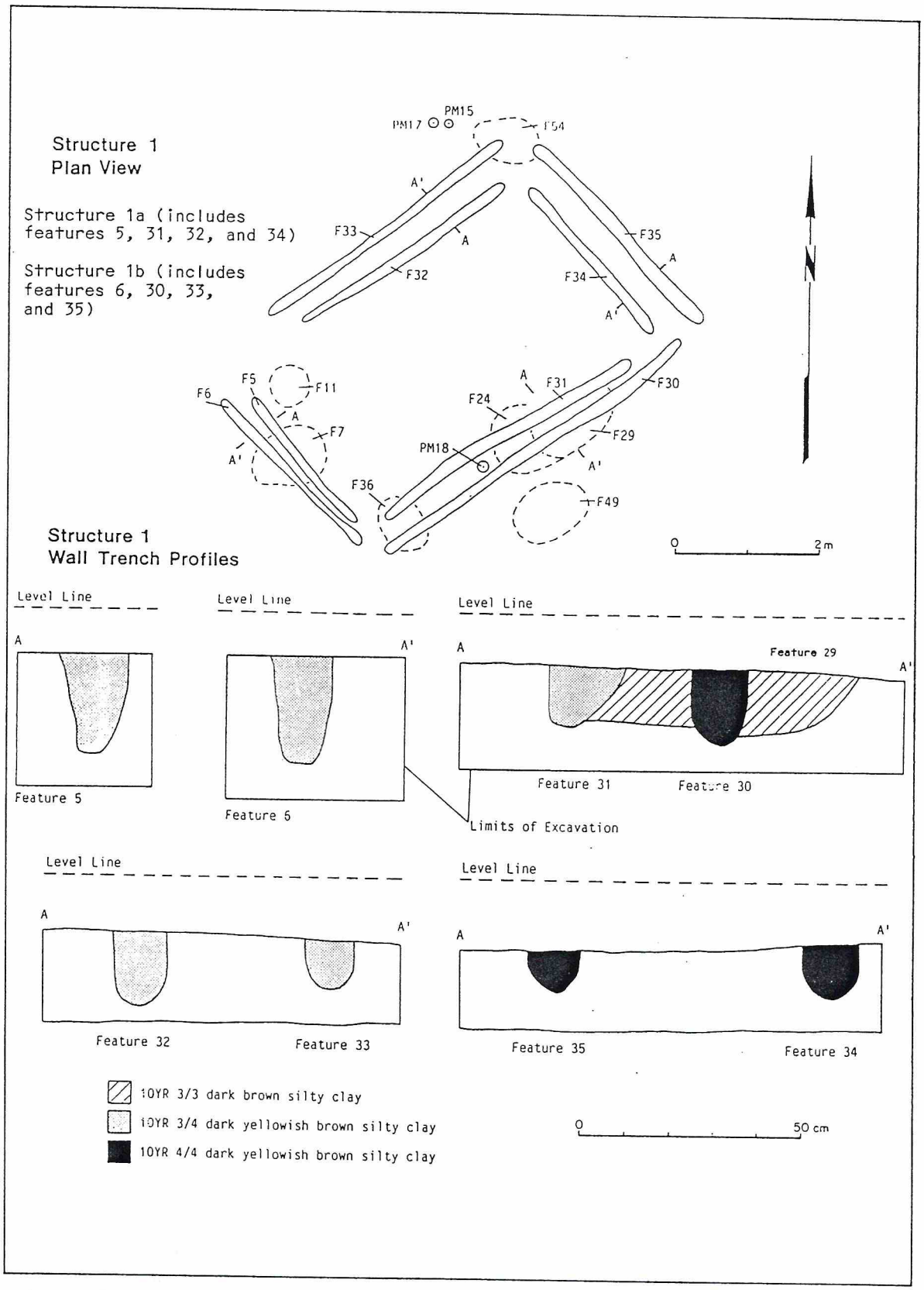


Figure 14. Plan view and wall trench profiles, structure 1.

Table 7. Wall Trench Data, Structure 1.

Structure	Maximum Length (m)	Maximum Width (m)	Maximum Depth (m)	Munsell Color (10YR)	Shape	Material
1A						
Feature 5	2.28	18	23	3/4	Sloping side, flat bottom	
Feature 31	4.00	20	15	3/4	Sloping side, round bottom	1 hoe flake
Feature 32	3.40	8	18	4/4	Straight side, round bottom	
Feature 34	2.48	14	12	4/4	Straight side, round bottom	
1B						
Feature 6	2.80	14	24	3/4	Straight side, round bottom	
Feature 30	5.06	14	18	4/4	Straight side, round bottom	4 debitage, 1 chert tool, 1 I/M
Feature 33	4.00	16	11	4/4	Straight side, round bottom	
Feature 35	3.48	20	9	4/4	Straight side, round bottom	

Table 8. Structure 1 Measurements.

Measurements (m)	Structure 1A	Structure 1B
Exterior Length	5.35	5.575
Interior Length	5.05	5.35
Exterior Width	3.05	3.80
Interior Width	2.80	3.60
Maximum Area	16.31 m^2	12.18 m^2
Interior Floor Area	14.14 m^2	19.26 m^2
Orientation of Long Axis	NE-SW	NE-SW

internal features, but these may be due to the eroded nature of structure 1. For example, structure 1 lacks an internal hearth, a feature type associated with three sets of Mississippian structures at the Jamestown site (21C4-14), two structures at the Galum Crossing site (21C4-29), one structural complex at the unplowed Cutler site (21C4-34), and two structures at the Bonnie Creek site (21C4-46). The only structures to lack internal hearths were the very large structure 2a at the Bonnie Creek site, which was interpreted as a possible summer house (Wagner 1986a:81-83), and a small, rectangular structure at the Cutler site. Given the very shallow depth of the structure 1 wall trenches, the lack of an internal hearth is probably associated with the destruction of the structure basin by plowing and erosion rather than reflecting a seasonal or functional difference for the structure.

The rectangular shape of structure 1 has been documented at the other Mississippian sites in the mine and appears to be the typical Mississippian house shape in the area. Exceptions include the almost square structure 2a at the Bonnie Creek site (Wagner 1986a) and the remains of three very small circular structures (structures 9-11) at the Jamestown site (Wagner 1986b). In terms of size, the internal floor area of structure 1 (Table 7) is close to that of structures 7b (13.4 m^2), 8a (11.99 m^2), and 8c (16.5 m^2) at the Jamestown site. Carbonized wood from structure 7 returned an unadjusted date of A.D. 1330±70, while structure 8 was dated at A.D 1430±50 (Wagner 1986b). The close similarity of the structure 1 floor area to those of the late Mississippian structural complexes at the Jamestown site could indicate a similar late date for structure 1; however, structures associated with the late Mississippian occupation at the Bonnie Creek site (Wagner 1986a) had a mean floor area of 29.2 m^2, much larger than at the Jamestown or Lightfoot sites. There appears to be considerable variance in late (A.D. 1250-1450) Mississippian house size in the upper Galum Creek valley, and changes in house size through time similar to those defined in the American Bottom (Milner and Williams 1981:192) and the lower Kaskaskia River valley (Hargrave et al. 1983:170) cannot be defined with any degree of confidence at the present time.

Structure 2

A cluster of 15 post molds (post molds 3-17) located to the north of structure 1 was interpreted as the possible remains of a Late Woodland post structure (Figure 15). The posts were very distinct when the plow zone was mechanically removed from this part of the site, and the area surrounding the posts was both shovel scraped and troweled to insure all posts were located. Interpretation of the posts as Late Woodland is based on (1) the presence of Late Woodland sherds in two of the posts (8 and 12), and (2) the absence of Mississippian sherds in any of the posts (Table 9). Ten of the posts (post molds 3, 4, 6-12, 14) form a northwest-southeast oriented arc approximately 6.5 m long. This alignment may represent the remains of a pole structure partially destroyed by the plowing and mechanical stripping. Several of the post molds had a defined depth of less than 10 cm below the stripped surface, suggesting that shallower posts associated with the structure may have been destroyed. Four sets of post molds (4 and 6, 8 and 9, 10 and 11,

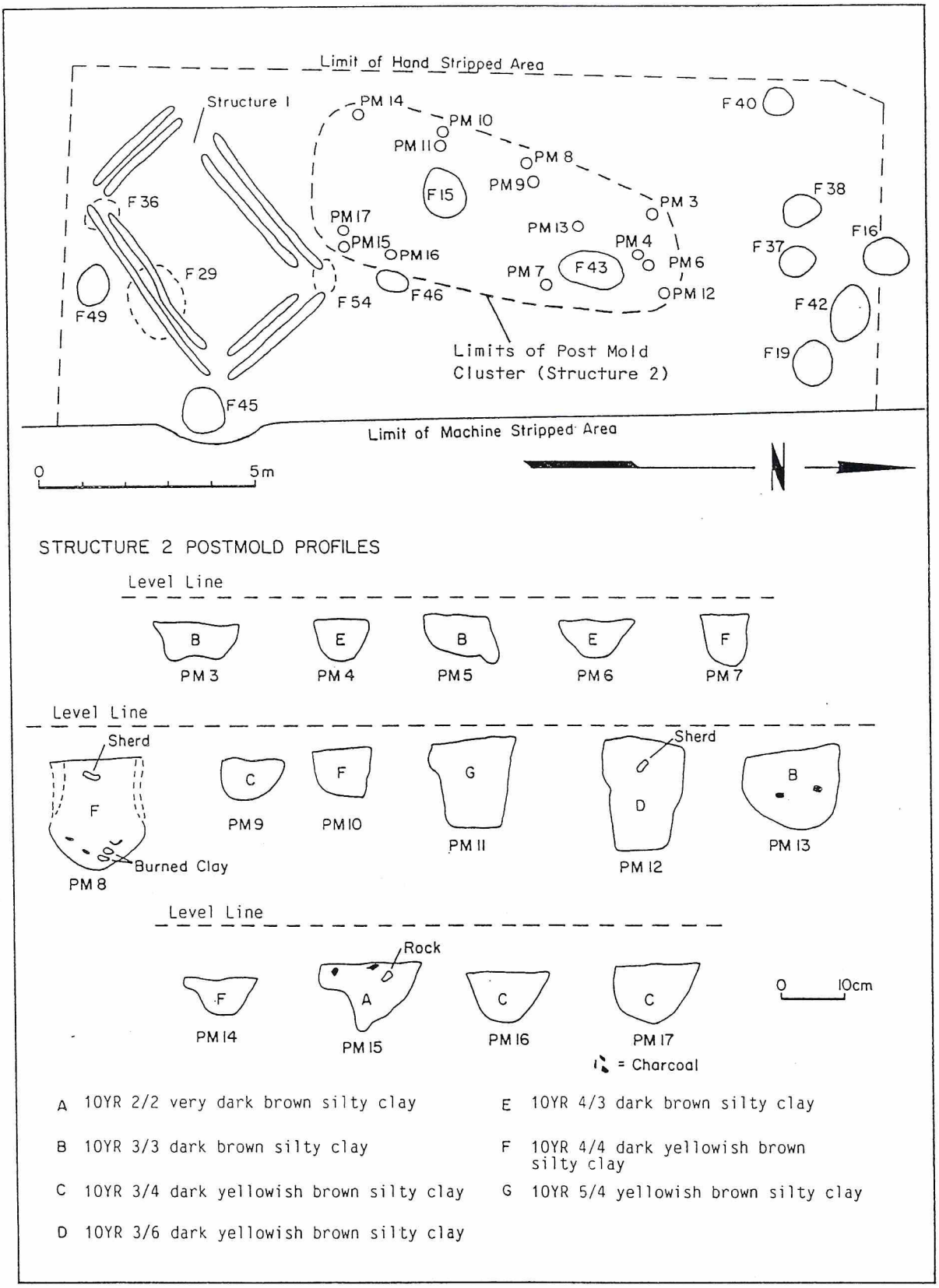


Figure 15. Plan view and post mold profiles, structure 2.

Table 9. Post Molds, Structure 2.

Post Mold	Diameter (cm)	Depth (cm)	Munsell Color (10YR)	Inclusions	Material
3	15	7	3/3		
4	10	7	4/4		
5	11	9	3/3	Charcoal	
6	13	6	4/3		
7	8	9	4/4	Charcoal	
8	16	20	3/3 to 3/4 to 4/4	Charcoal, burned clay, burned limestone	4 grit-tempered sherds, 2 chert flakes
9	11	8	3/4	Charcoal, nut fragments	
10	12	8	4/4	Charcoal	
11	15	15	3/3 to 4/4	Charcoal, burned clay	
12	14	20	3/6	Charcoal	1 grit-tempered rim
13	16	15	3/3	Charcoal	
14	13	10	5/4	Charcoal, burned clay	
15	17	11	2/2	Charcoal, nut fragments	
16	15	9	3/4	Burned clay	
17	15	10	3/3		

and 15 and 17) may represent paired post molds located along a wall. In the case of post mold pairs 8/9 and 10/11, a large, deeper post is located adjacent to a smaller, shallow post. The other two post pairs (4/6 and 15/17) are comprised of posts approximately equal in size. Distance beteween the posts in the alignment varied from 0.8 m to 3.2 m with a mean distance of 1.69 m. The outline displayed in Figure 15 represents the maximum area encompassed by the post pattern rather than the actual shape of the structure. The maximum projected area for the structure (22.6 m) is larger than that of two complete small oval Late Woodland structures (3 and 12) defined at the Jamestown site which had areas of 12.6 m and 15.75 m, respectively.

The posts varied in diameter from 8 to 17 cm with a mean diameter of 13.4 cm. Depth ranged from 8 to 20 cm with a mean depth of 10.9 cm (Table 9). Eleven of the post molds had sloping sides terminating in a round or flat base, one was straight sided, and four had irregular sides. The posts exhibited considerable variation in fill ranging from a 10YR 3/4 dark yellowish brown to a 10YR 2/2 dark brown silty clay. Ten of the posts contained inclusions in the form of charcoal flecks, burned clay, or burned limestone, while two (8 and 12) contained grit-tempered

Late Woodland sherds and lithic debitage. No floor or basin was associated with the posts. Two large, shallow basins (features 15 and 43) were contained within the area encompassed by the posts, but it is unknown whether they are associated with the post pattern. Feature 15, however, was the only shallow basin to contain any evidence of in situ burning in the form of areas of burned clay along the feature base and edges. Although rather large for a hearth, feature 15 could represent a possible cooking facility associated with structure 2.

Pit Features

Seventy four features were excavated at the Lightfoot site during 1983 and 1984. Eight of these were structures or structural elements such as wall trenches, three were determined to be natural after excavation, and one was redefined as a post. The remaining 62 features consisted of pits that had been excavated into the clay subsoil in conjunction with prehistoric activities such as food storage, cooking, and refuse disposal. These features were initially separated into three morphological classes on the basis of size, depth, and appearance in plan view (i.e., shallow basins, shallow pits, and deep pits) using the format developed for the analysis of pit features at the Bonnie Creek site, a late Mississippian homestead in the study area (Wagner 1986a). All features with a defined depth of less than 30 cm were classified as shallow, while those with a depth greater than 30 cm were classified as deep. Features were classified as circular, oval, or amorphous based on their appearance in plan view, with the amorphous category containing features whose original appearance was undefinable due to disturbance by root or rodent activity or the construction of later features through them. Diameter in plan view was used to seriate the features as to size. Features with a diameter of 0-35 cm were classified as small, 36-75 cm as medium, and 76-100+ cm as large. Features were defined as either basins or pits based on their appearance in profile view. Basins were defined as those features in which there was no definable break between the feature walls and base. Pits, on the other hand, possessed distinct walls and bottoms. Feature contents were used to define the function of the individual pit features whenever possible. Specific feature functions recorded at the Lightfoot site included possible hide smudging, refuse disposal, cooking, and storage (Table 10).

The pit feature analysis had two objectives:

1. Delineation of pit feature types associated with early Late Woodland occupations in the upper Galum Creek valley. The Late Woodland ceramic assemblage from the Lightfoot site is very homogenous and exhibits attributes such as interior punched nodes believed to be associated with early Late Woodland occupations in the project area. Changes in pit feature types between early Late Woodland sites such as the Lightfoot site and later sites such as the Mississippian period Bonnie Creek site may be associated with changes in subsistence activities.

Table 10. Pit Feature Data.

Feature	Maximum Dimensions (cm)	Depth (cm)	Morphology	Ceramics CO	Ceramics LW	Rock SS	Rock LS	Rock IM	Rock LIM	Chert Debitage*	Chert Tools*	Other*	Fauna #	Carbonized Botanical Nuts (Wt/g)	Carbonized Botanical Seeds (Ct)	Carbonized Botanical Wood (Wt/g)	Possible Function
2	140 x 78	23	Amorphous		6	3		18	1	7	1						Unknown
7	110 x 78	12	Shallow oval basin		18		6	2		6			3	0.6	3		Unknown
9	82 x 78	37	Deep pit					1									Storage pit
10	82 x 84	20	Shallow circular basin		2		63										Unknown
11	65 x 65	18	Shallow circular basin		5	4		5		3							Unknown
12	70 x 65	9	Shallow circular basin		14												Unknown
13	96 x 79	21	Shallow oval basin	3	17		28	3		2		A	6	0.1		0.05	Unknown
14	80 x 60	9	Shallow oval basin			1	12			1	1		13	0.1		0.15	Unknown
15	100 x 82	10	Shallow circular basin		44		1			2				0.3			Unknown
16	90 x 88	42	Deep bell shaped pit	2	47	2	5	11	1	17	1		5	0.15		0.35	Cooking pit
17	52 x 50	6	Shallow circular basin			1	4			1							Unknown
18	58 x 56	8	Shallow circular basin				1	2									Unknown
19	110 x 95	27	Shallow circular basin		13	2		3	1	4	5		8				Unknown
20	155 x 95	22	Shallow oval basin	1	4	13	65	7		6	1	B	25	0.2		0.1	Unknown
21	83 x 68	12	Shallow oval basin			1			3	8	2				2	0.45	Unknown
22	84 x 64	15	Shallow oval basin		36		1			1		C		1.3		0.7	Unknown
23	90 x 80	7	Shallow circular basin											0.2	1	0.6	Unknown
24	83 x 78	10	Shallow circular basin		7	1	7			2			135				Unknown
25	98 x 94	7	Shallow circular basin		2	4	2					D	12	0.4		0.25	Unknown
26	74 x 70	5	Shallow circular basin			1											Unknown
27	136 x 83	18	Shallow oval basin	1	24		2			3	1	E				0.2	Unknown
28	113 x 103	10	Shallow circular basin		9		2	2		2	1		1	0.3	1		Unknown
29	(87?) x (59(?)	15	Shallow oval pit			1	1		1	4							Unknown
36	90 x 60	22	Shallow oval basin						1		1						Unknown
37	75 x 70	6	Shallow circular basin														Unknown
38	83 x 53	19	Shallow oval basin			2		1									Unknown
39	87 x 85	11	Shallow circular basin		5		5	1					7	0.25			Unknown
40	80 x 73	11	Shallow circular basin		28		1	10									Unknown
41	105 x 70	12	Shallow oval basin	1	3									1.55	2		Unknown
42	102 x 73	15	Shallow oval basin		5		2	3		1			2				Unknown
43	128 x 85	3	Shallow oval basin														Unknown
44	65 x 50	7	Shallow oval basin														Unknown
45	103 x 98	20	Shallow circular basin	19	19		1	5		7		F		0.94			Unknown
46	58 x 58	8	Shallow circular basin		1		1	2		3							Unknown
47	72 x 70	13	Shallow circular basin	2	3		3	3			1		10				Unknown
48	136 x 119	97	Deep bell shaped pit		18					48	6		15	0.81		0.76	Storage pit
49	111 x 85	12	Shallow oval basin	1	10	1		4	1	5	1						Unknown
50	58 x 36	2	Shallow oval basin			4	13	1									Unknown
51	95 x 65	14	Shallow oval basin					4			1						Unknown
52	78 x 71	5	Shallow circular basin			1					1						Unknown
53	47 x 34	2	Shallow oval basin			2											Unknown
54	95 x 60	5	Shallow oval basin		6						1						Unknown

* = all functional categories, excluding celt/ax and plummet preform, are quantified by number of functional surfaces or edges, not individual items.

A = 2 manos, 1 hammer, 1 anvil
B = 2 manos, 2 hammers, 1 celt
C = 4 manos, 1 hammer, 1 anvil
D = 1 plummet
E = 2 hammers, 1 anvil
F = 5 manos, 2 hammers, 1 anvil, 2 pitted stones
G = 2 manos
H = 2 manos
I = 2 slotted abraders

CO = Crab Orchard
LW = Late Woodland
SS = Sandstone
LS = Limestone
IM = Igneous/Metamorphic Rock
LIM = Limonite

Table 10. (Cont'd).

Feature	Maximum Dimensions (cm)	Depth (cm)	Morphology	Ceramics CO	Ceramics LW	Rock SS	Rock LS	Rock IM	Rock LIM	Chert Debitage*	Chert Tools*	Other*	Fauna #	Carbonized Botanical Nuts (Wt/g)	Carbonized Botanical Seeds (Ct)	Carbonized Botanical Wood (Wt/g)	Possible Function
55	115 x 90	57	Deep bell shaped pit			5	12	41	19	9	1	G		0.39			Storage pit
56	80 x 78	6	Shallow circular basin		3	1	9			2							Unknown
57	111 x 111	30	Deep pit		4	2	10	1		6	7		14				Unknown
58	78 x 63	3	Shallow circular basin		2			2		1							Unknown
59	70 x 50	13	Shallow oval basin			2		10		3		H					Unknown
60	102 x 78	18	Shallow oval basin							3	1						Unknown
61	105 x 175	10	Shallow oval basin		17	2	106	2					47	0.05		1.6	Unknown
62	75 x 75	6	Shallow circular basin		1	3	21										Unknown
63	78 x 78	12	Shallow circular basin		7					1	2		8				Unknown
64	110 x 70	9	Shallow oval basin		3												Unknown
65	34 x 21	4	Shallow oval basin							1							Smudge pit(?)
66	70 x 70	14	Shallow circular basin		5	2				2	1		2				Unknown
67	80 x 80	16	Shallow circular pit		21					6	1						Cooking pit
68	84 x 68	1	Shallow oval basin														Unknown
69	100 x 100	19	Shallow circular basin		36	7		5		2							Unknown
70	79 x 50	10	Shallow oval basin		114					2			1				Unknown
71	100 x 85	13	Shallow circular basin					1		1							Unknown
72	62 x 58	12	Shallow circular basin									I					Unknown
73	65 x 65	20	Shallow circular basin					1									Unknown
74	71 x 70	3	Shallow circular basin														Unknown

2. A determination of the types of prehistoric activity that occurred at the site based on an analysis of the various functional pit features and their material contents.

In the following section, a general description of each feature class is presented followed by detailed descriptions of representative examples of each class. The material contents, location, dimensions, and other data in regard to the pit features is presented in Table 10.

Possible Smudge Pits (n=1)

Smudge pits are defined here in accordance with the basic criteria provided by Binford (1972:37-45). According to Binford, smudge pits are small pits excavated into the subsoil that contain a basal layer of charred twigs overlain by a layer of charred corncobs. The upper part of the pit is filled with grayish loam, indicating an intentional filling of the pits and its contents (Binford 1972:380). Binford has documented the use of this type of facility by historic Indian groups for hide smoking, although Munson (1969) suggested that they may also have been used to smudge ceramic vessels. Smudge pits also are found on nineteenth century American sites and may have been used as a counteractive to "miasmic gases" thought to emanate from low, swampy areas. It was thought that creating a smoky atmosphere would purify the air of miasmata believed to cause malarial fevers (McCorvie 1987:63-66). Smudge pits are a common feature type at Mississippian sites in the till plains and have been found at the Toothsome (Binford 1964) and Texas (Morrel 1965) sites in the Carlyle reservoir area; at the Reiling and Mike Adamson sites (Wagner and McCorvie 1986) in the Rend Lake reservoir area; at the Marty Coolidge (Kuttruff 1972) and Bridges (Hargrave et al. 1983) sites in the lower Kaskaskia River drainage; and at the Galum Crossing (Powell n.d.), Cutler, and Bonnie Creek sites (Wagner 1986a) in the Galum Creek valley in Perry County, Illinois, among others.

The single possible smudge pit (feature 65) at the Lightfoot site was located along the southern site periphery (Figure 13). The feature was uncovered during the mechanical removal of the plow zone and initially was defined as a smudge pit similar to those found at other Mississippian sites in the mine. However, the feature was scraped a second time with the consequence that most of the feature contents were removed. The feature appeared as a small, dark, oval stain only 4 cm deep and slightly darker that the surrounding clay matrix. Charcoal flecks, charred nuts, and burned clay were contained within the fill, with a concentration of charred nuts in the southeast corner of the feature. Charred nuts were found in some of the Mississippian smudge pits at the Bonnie Creek site (Wagner 1986a:87-95), and their occurrence in a similar context at the Lightfoot site would not be unexpected. A single piece of lithic debitage was recovered from the fill. Based on its appearance when first uncovered, feature 65 is interpreted as a probable smudge pit. Its cultural affiliation is unknown, but it was located 15 m southwest of the Mississippian house (structure 1) and may be associated with the Mississippian occupation.

Shallow Basins (n=53)

Shallow basins were the most frequent feature type at the site, comprising 88.3% of the pit features. The high frequency of this feature type is related to the eroded condition of the site, with many of the pit features located on the site slopes measuring less than 10 cm in depth (Table 10). Many of these are probably the remains of deeper pit features that were truncated by plowing and the mechanical stripping. Orifice diameter varied from large (n=35) to medium (n=18), while shape in plan view varied from oval (n=24) to circular (n=29). Exact dimensions are provided in Table 10. Most of the features contained little or no cultural material and were filled with a 10YR 3/4 to 4/4 dark yellowish brown silty clay only slightly darker than the underlying clay matrix. Material within these features included Late Woodland ceramics, Crab Orchard ceramics, lithic debitage and tools, igneous/metamorphic rock fragments, and burned sandstone and limestone. Based on the presence of Late Woodland ceramics, features 10-13, 15, 19, 20, 22-25, 27, 28, 39-42, 46, 47, 49, 54, 56, 61-64, 66, 69, and 70 are interpreted as Late Woodland features. In addition, partial body sections of Late Woodland vessels were found in features 16 and 22 while partial jars with both noded and unnoded rims were found in features 12, 13, and 15. The single Crab Orchard basin identified (and the only definite Crab Orchard feature found at the entire site) was feature 45. The remaining features were aceramic, but this is probably a reflection of the shallowness of these features with most actually being associated with the Late Woodland occupation. Small flecks of burned clay, charcoal, and burned bone were present as minor inclusions in the fill of almost every basin (Table 10). None of the features exhibited evidence of in place burning with the exception of feature 15, which contained a burned clay concentration in the south half of the feature with burned clay mottling near the edges of the feature. Information regarding all shallow basins is listed in Table 10, while descriptions of representative examples are provided below.

Feature 13 was a large, shallow, oval basin that contained a partial Late Woodland jar with a restricted orifice (Table 10). Unlike many of the other basins which appeared to have filled naturally, feature 13 contained a dark brown midden-like fill with burned limestone, charcoal flecks, burned clay, and burned and unburned bone present. Other material included two pieces of lithic debitage.

Feature 15 was a large, shallow basin with a maximum diameter of 100 cm and a defined depth of 10 cm. Similar to feature 13, feature 15 contained a dark brown fill with burned clay, burned bone, and charcoal as inclusions. Cultural material from within the feature included 44 sherds to a partial Late Woodland jar with interior punched nodes and two pieces of lithic debitage. As mentioned above, feature 15 was the only shallow basin to exhibit possible in situ burning, with a burned clay concentration in one half of the feature as well as burned clay mottles near the feature edges. The feature is enclosed within the post cluster believed to be a Late Woodland structure (structure 2) and may be associated with this structure.

Feature 20 (Table 10) was a large, kidney shaped basin that may in actuality consist of two overlapping features. However, in profile no difference could be distinguished between the two halves of the feature, which appeared as a basin with gently sloping sides. Feature 20 contained a large amount of burned limestone (847 g) and sandstone (326 g) but no indication of in place burning, suggesting this material was burned elsewhere and deposited in the feature.

Feature 39 (Figure 16; Table 10) was a circular, shallow basin with a maximum depth of 11 cm beneath the stripped surface. Burned clay, burned limestone, and small charcoal flecks were present in the fill, but there was no evidence of in place burning. Prehistoric cultural material within the feature consisted of five body sherds. Similar to many of the other basins at the site, feature 39 is interpreted as the base of a truncated deeper feature. The feature function could not be determined.

Feature 45 (Table 10) was the only definite Crab Orchard feature found at the Lightfoot site although Crab Orchard ceramics were recovered in small quantities in association with Late Woodland ceramics in six other features (Table 10). The feature contained a very dark clayey fill with charcoal and burned clay flecks scattered throughout. Again, as with the other basins, there was no definite evidence of in situ burning such as a burned clay layer. Cultural material from within the feature consisted of 19 (143.5 g) cordmarked Crab Orchard body sherds; seven pieces of debitage manufactured from Cobden, Blair/St. David, and glacial chert; and limestone (126 g) and igneous/metamorphic rock (512 g).

Feature 49 (Figure 16; Table 10) was an oval basin interpreted in the field as a Crab Orchard feature on the basis of thick grit-tempered ceramics and a rounded base projectile point within the feature fill. Examination of the ceramics after cleaning revealed that 10 were cordmarked Late Woodland ceramics while only 1 was Crab Orchard. Other material within the feature consisted of five pieces of lithic debitage and a small amount of sandstone, limonite, and broken igneous/metamorphic rock (Table 10). The feature had a maximum depth of 11 cm bs and contained a silty clay fill with a slight amount of charcoal and burned clay flecking. In situ burning was not present. Function is unknown.

Large Shallow Pits (n=2)

Feature 29 (Table 10; Figure 14) was a shallow, oval pit largely destroyed by the construction of the southeastern wall trenches (features 30 and 31) of structure 1. The feature contained a homogenous clayey fill from which a small amount (n=3) of limestone, sandstone, and limonite was recovered. The cultural affiliation is unknown, but the feature probably predates the Mississippian occupation. Function was also indeterminate.

Feature 67 (Table 10; Figure 13) was a large, shallow, circular pit with a diameter of 80 cm and a defined depth of 16 cm. The feature had

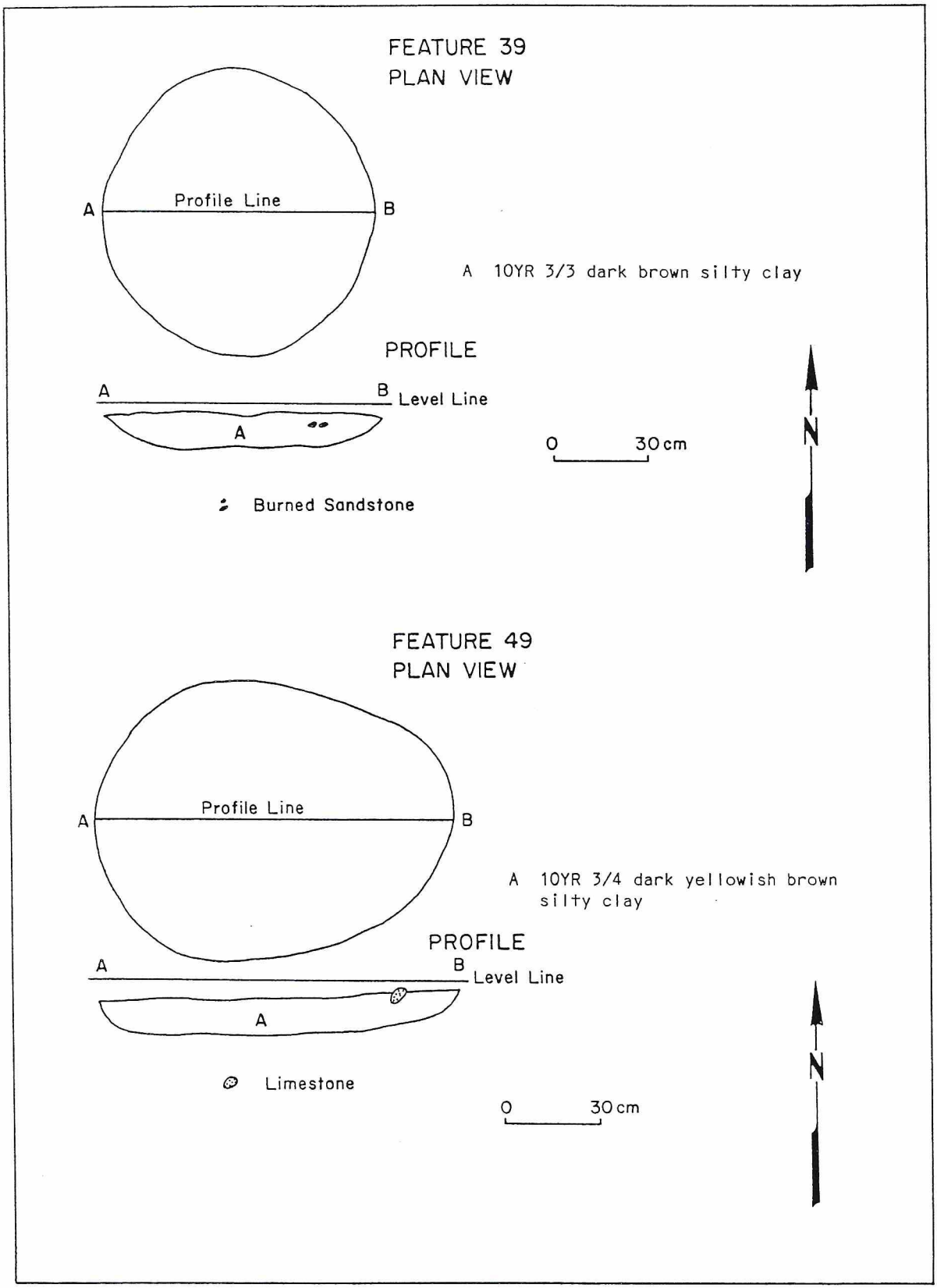


Figure 16. Plan views and profiles, shallow basins, features 39 and 49.

flaring walls and a flat bottom, characteristics that suggest feature 67 may represent the base of a deeper bell shaped or flared base pit. The feature fill was a very rich-looking 10YR 3/3 dark grayish brown with large pieces of charcoal scattered throughout. Some of the sherds appeared to be burned, and burned bone was also present. During the excavation of the second half of the pit, in situ burning in the form of a diffuse area of burned soil containing burned clay, burned bone, and charcoal was present approximately 5 cm above the base of the feature. A wood charcoal sample from this layer returned a radiocarbon date of 1370±70 (A.D. 580±70). Cultural material within the feature consisted of Late Woodland body sherds (n=21), lithic debitage (n=6), and chert tools (n=1). Other material within the feature included a small amount of burned limestone, limonite, and igneous/metamorphic rock fragments. Feature 67 is interpreted as the remains of a deeper earth oven that was truncated by plowing and the mechanical removal of the plow zone.

Deep Pits (n=5)

Five deep pits (features 9, 16, 48, 55 and 57) were present at the site. Two of the pits (features 9 and 57) were flat bottomed with relatively straight sides while three (features 16, 48, and 55) had flared or belled bases. The pits varied from oval to circular in plan view. Depth ranged from 30 cm to 97 cm with a mean of 52.6 cm.

Of the two straight sided pits, feature 9 (Table 10; Figure 8) was defined during the controlled excavations in unit 28 and was discussed earlier in this report. Feature 57 (Table 10; Figure 13) was a very large, circular pit uncovered by the mechanical stripping. The feature had a maximum diameter of 111 cm and a defined depth of 30 cm. Fill strata were not visible in profile. The feature fill consisted of a homogenous 10YR 3/3 dark brown silty clay with a light scattering of charcoal and burned clay flecks. Lithic artifacts consisted of debitage (n=3), a single hoe flake, and a small amount of limestone, sandstone, and igneous/metamorphic rock (Table 10). Four Late Woodland sherds and a small amount of fauna (n=3) were also present. Based on its large diameter and lack of in situ burning, the feature may represent a truncated storage pit secondarily used for refuse disposal.

The three flared base pits (features 16, 48, 55) were all located during the mechanical stripping. Features 16 and 48 were located adjacent to each other at the northwest edge of the site. Feature 16 (Figure 17; Table 10) was a circular, straight sided pit with walls that flared slightly outward at the base. Feature 16 contained relatively little material for a feature of its depth (42 cm) with most of the artifacts coming from the bottom 5 cm of the feature. The base and center of the feature contained a 10YR 4/4 dark yellowish brown silty clay (layer A) with a small amount of charcoal and burned clay flecks. A partial Late Woodland restricted orifice jar and a fragmentary turtle carapace were contained within this basal layer together with a small amount of lithic debris (Table 10). Layers of dark yellowish brown clay (B, C, and D) representing slumping of the feature walls into the feature center were present on both sides of the pit. Based on its depth

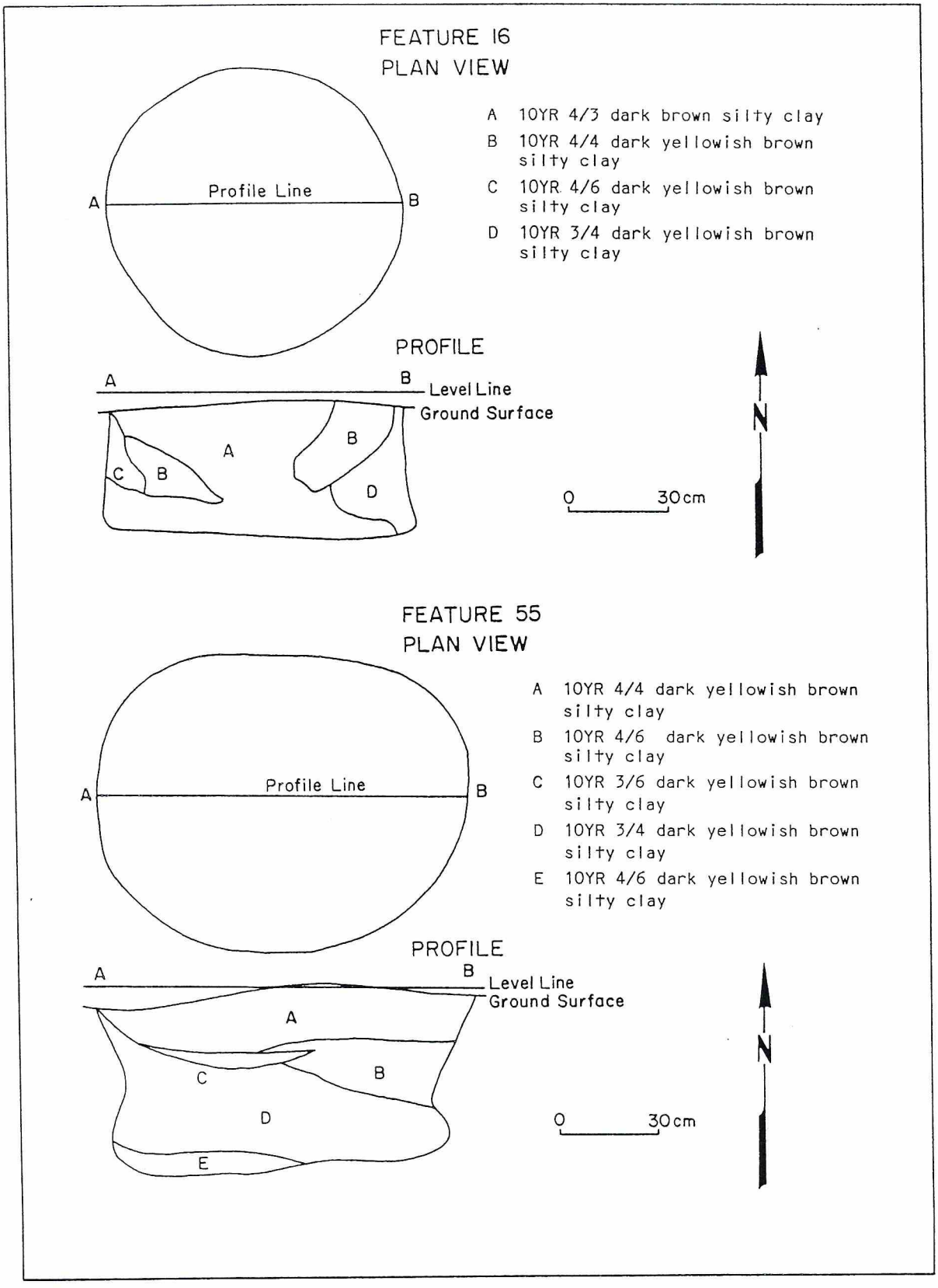
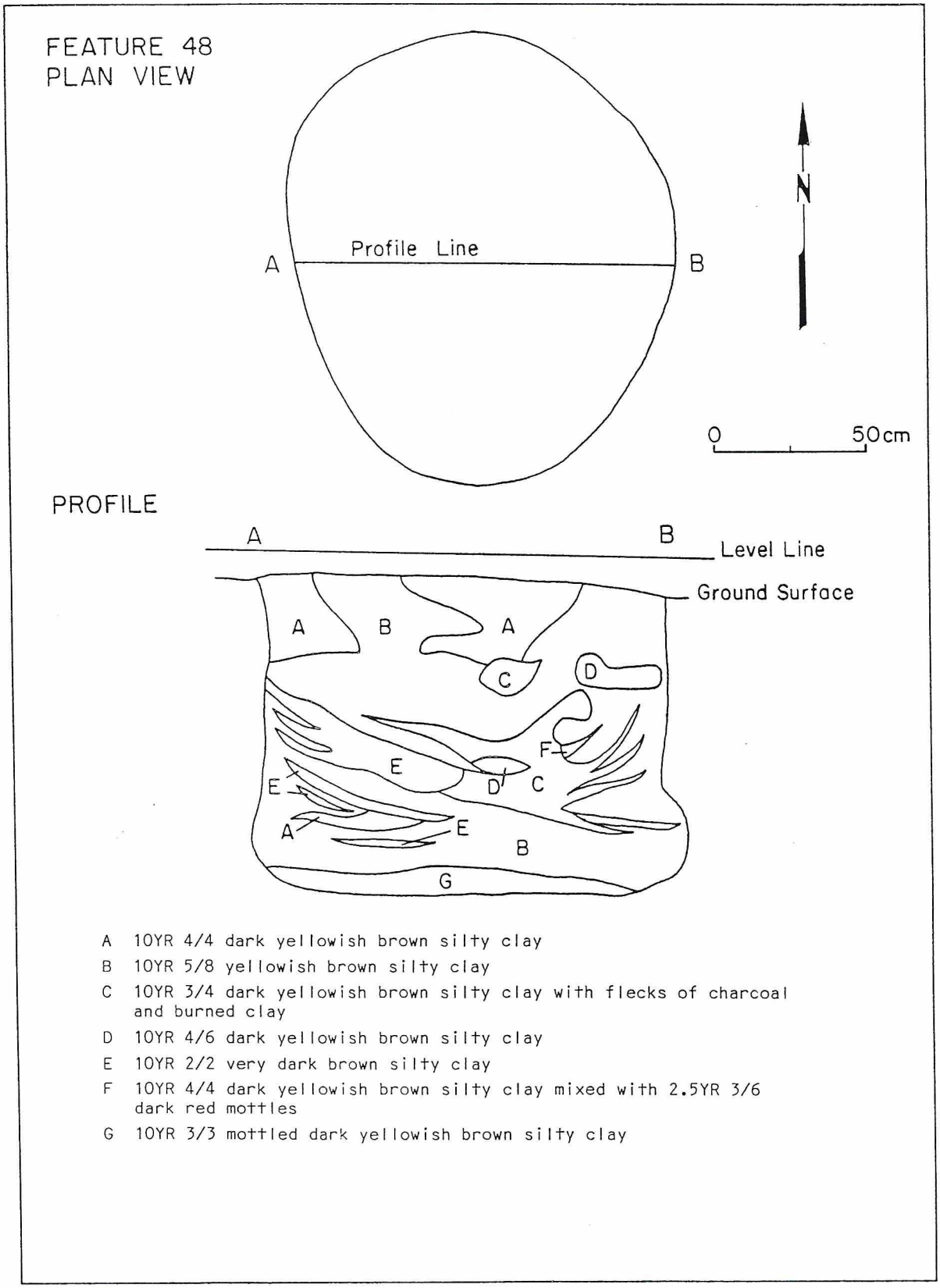


Figure 17. Plan views and profiles, deep pits, features 16 and 55.

and lack of burning, feature 16 is interpreted as a storage pit secondarily used for refuse disposal. Following the removal of the feature contents, a small amount of debris, including a partial vessel and faunal material, was intentionally discarded into the open pit. Feature 16 filled naturally after this, with the walls gradually collapsing into the pit. Finally, the lack of cultural material within the upper section of soil layer A (Figure 17) suggests this layer represents naturally washed in soil.

Feature 48 (Table 10; Figure 18) was the deepest feature at the site with a depth of 97 cm beneath the stripped surface. The feature was relatively straight sided with a flared to belled base. Although much deeper than feature 16, feature 48 is very similar to that feature in terms of its internal morphology. Multiple internal soil horizons were defined within the feature. The lowest layer (G) consisted of a dark brown charcoal and burned clay flecked silty clay layer containing a small amount of discarded cultural material. The feature began to fill naturally after this, with layer B consisting of a very light 10YR 5/8 yellowish brown silty clay that was virtually void of material. Interspersed within this zone on the west side of the feature were four 10YR 2/2 very dark brown silty clay zones (E) that varied in thickness from 1 cm to 15 cm. In contrast to zone B, these layers appear to represent episodes of cultural deposition within the feature. All contained cultural debris and large amounts of charcoal, burned clay, and burned soil, indicating that in place burning occurred on this side of the feature in these layers. Soil horizons on the east side of the feature (C, D, and F) represent part of the same filling activity that created soil layer E, but layers C and D lack evidence of burning and contained very little charcoal or burned clay. Soil horizon F was a small lens of dark yellowish brown clay with evidence of in situ firing in the form of dark red burned clay mottling. Following these episodes of burning and trash deposition in the lower half of the feature, the pit again filled naturally with a layer of washed in, culturally sterile soil (B) covering the burned soil horizons. Finally, small pockets of 10YR 3/4, 4/4, and 4/6 silty clay (layers A, C, and D) near the top of the feature that contained small amounts of cultural debris are interpreted as episodes of intentional deposition. Cultural material from within the feature included a small (n=18) amount of Late Woodland sherds, a projectile point tip, and lithic debitage (n=48). Three flotation samples comprising a total volume of 50 liters were taken from separate burned horizons within the feature. These produced only nutshell fragments (Carya ovata and Carya spp.) and wood remains identified as Fagus grandifolia, or the American beech.

Feature 55 (Figure 17; Table 10) was a large, oval pit with a flared base located near the southern edge of the site. The feature had maximum surface dimensions 1.15 m east-west by .90 m north-south with a maximum defined depth of 57 cm. The feature walls slanted in at a relatively steep angle from the feature orifice, reaching a maximum constriction of 97 cm approximately 20 cm above the feature base. The walls flared out from this point, with the feature having a maximum diameter of 1.07 m at its base. Five zones were defined within the feature. The lower three zones (B, D, and E) represent natural filling



A 10YR 4/4 dark yellowish brown silty clay

B 10YR 5/8 yellowish brown silty clay

C 10YR 3/4 dark yellowish brown silty clay with flecks of charcoal and burned clay

D 10YR 4/6 dark yellowish brown silty clay

E 10YR 2/2 very dark brown silty clay

F 10YR 4/4 dark yellowish brown silty clay mixed with 2.5YR 3/6 dark red mottles

G 10YR 3/3 mottled dark yellowish brown silty clay

Figure 18. Plan view and profile, deep pit, feature 48.

episodes containing a small amount of cultural material. Differences between these zones primarily consisted of subtle color gradations, with all three zones comprised of a silty clay containing minute charcoal and burned clay flecks. The uppermost two soil zones (A and C) were comprised of a 10YR 3/6 to 4/4 silty clay and also were interpreted as natural filling episodes. These zones contained virtually no material and were very similar in color and texture to the surrounding clay matrix. Two bifacial chert tools interpreted as Archaic period tools--a corner-notched projectile point reworked into a knife and a broken projectile point (Koldehoff, this volume)--were found within the feature. The occurrence of Early to Late Archaic projectile points/knives in Late Woodland features in the upper Galum Creek valley is well documented at the main Late Woodland site in the mine--the Jamestown site (21C4-14)--and probably indicates curation and reuse of these earlier artifacts. No Late Woodland sherds were recovered from feature 55, but this is interpreted as a result of the manner in which the feature was filled (i.e., the natural washing in of soil and cultural material as opposed to intentional deposition) rather than indicating an Archaic origin for the feature. That this is probably the case is indicated by the low frequency of all cultural material from within the feature.

Amorphous (n=1)

Feature 2 (Figure 8; Table 10), the single feature contained within this category, was encountered as a very diffuse stain at the base of the plow zone in unit 2 and was described in the hand excavation section of this chapter. The feature extended into the western and northern walls of the unit and could not be adequately defined. If completely excavated, the feature probably would have been included within one of the other feature categories.

Other (n=4)

One stain in unit 23 initially interpreted as a pit feature (feature 8) was reclassified as a post mold following its excavation and was discussed in the hand excavation section of this chapter. Three other features (1, 3, and 4) were determined to be natural after excavation.

Discussion

A total of 35 Late Woodland features, 1 Crab Orchard feature, and 1 possible Mississippian feature was defined at the Lightfoot site. In addition, most of the aceramic features (primarily shallow basins) are believed to be the eroded remnants of Late Woodland features. One Mississippian wall trench structure and one possible Late Woodland pole structure were also present (Figure 13).

Very little can be said regarding Middle Woodland Crab Orchard or Mississippian community patterns at the site. A single Crab Orchard basin (feature 45) was located near the eastern edge of the stripped

area, while Mississippian features consisted of the wall trench structure (structure 1) and perhaps the possible smudge pit (feature 65). Additional features associated with both occupations may have been destroyed by plowing and the mechanical stripping, but there is some evidence to believe this is not the case. The test unit data indicated that the Crab Orchard and Mississippian ceramics were distributed over a relatively small area of the site (1,200 and 900 square meters, respectively). Similarly, the small amount of Crab Orchard and Mississippian ceramics (27 and 40, respectively) recovered from the hand excavation of approximately 33 m^2 of the site area suggests that the occupations associated with these ceramics were not intensive. Although features associated with both occupations were probably destroyed by plowing and erosion, it is doubtful that there were a large number of features to start with. Using the data from the excavation units, the frequency of Mississippian ceramics at the Lightfoot site was 1.08 sherd per 1 m^2. In contrast, the frequency of Mississippian ceramics in the plow zone of the Bonnie Creek site, a Mississippian homestead with multiple structures and 46 pit features (Wagner 1986a), was 4.88 per 1 m^2, or over four times higher than at the Lightfoot site. If only the units containing Mississippian ceramics at the Lightfoot site are considered, the ceramic frequency per m^2 rises to 2.04 sherds, still less than half that of the Bonnie Creek site.

The Late Woodland community pattern at the site is characterized by a lack of clearly defined activity areas or discrete pit feature clusters (Figure 19). Assuming the aceramic features are Late Woodland, the Late Woodland pit features are distributed in two ill-defined groups. The first group (features 2, 7, 11, 15, 16, 19, 25, 26, 28, 29, 36-44, 46-49, 54, 55, 67, and 74) was located along the eastern and northern boundaries of the mechanically stripped area and contained 27 features. The possible post structure (structure 2) and two isolated post molds (post molds 2 and 21) also were contained in this area. This was the highest elevation area of the site, generally conforming to the area that would have been above the 138.5 ft contour line before the plow zone was removed. The second group contained 33 features (8-10, 12-14, 17, 18, 20-24, 27, 50, 52, 53, 57-64, 66, 68-73) and was located along the southern edge and western area of the site in the area that would have been below the 138.5 ft contour line before the plow zone was removed. No difference was evident in the types of features contained within these groups, with shallow basins being the predominant feature type in both groups (Figure 20). Deep pits were present within both groups, and there appears to be a slight clustering of this feature type at the Lightfoot site, possibly indicating the location of food storage areas. Two deep pits (features 16 and 48) were located adjacent to each other approximately 5 m north of structure 2, while features 55 and 67 were located within 5 m of each other to the south of the structure. Similarly, the two deep features in the area below the 138.5 ft. contour line (features 9 and 57) were located approximately 5 m from each other. Feature 48 was the only deep feature to contain evidence of in situ burning, indicating possible use as an earth oven.

The lack of an organized Late Woodland community plan with discrete feature clusters, the low representation of burning within the

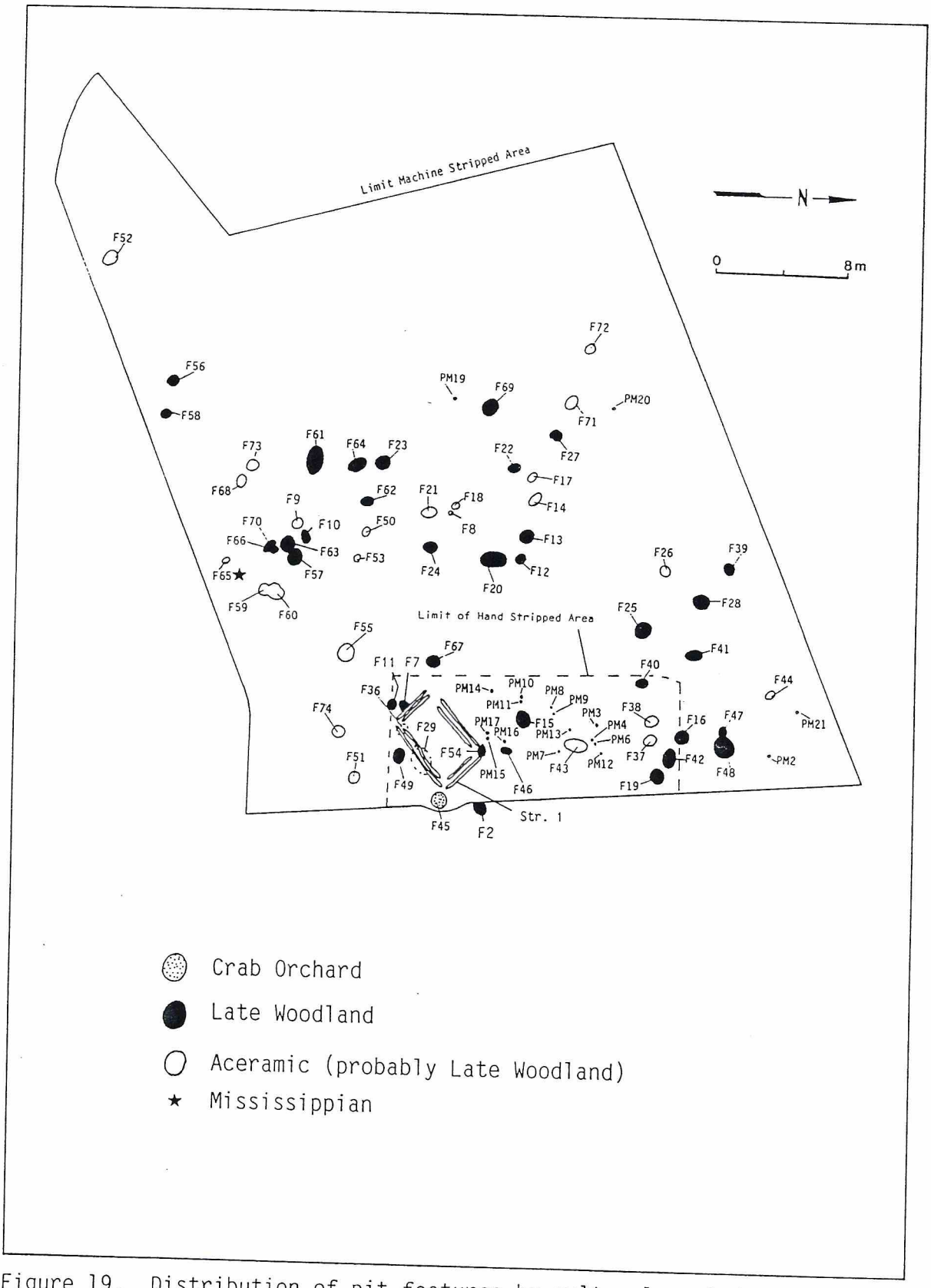


Figure 19. Distribution of pit features by cultural period.

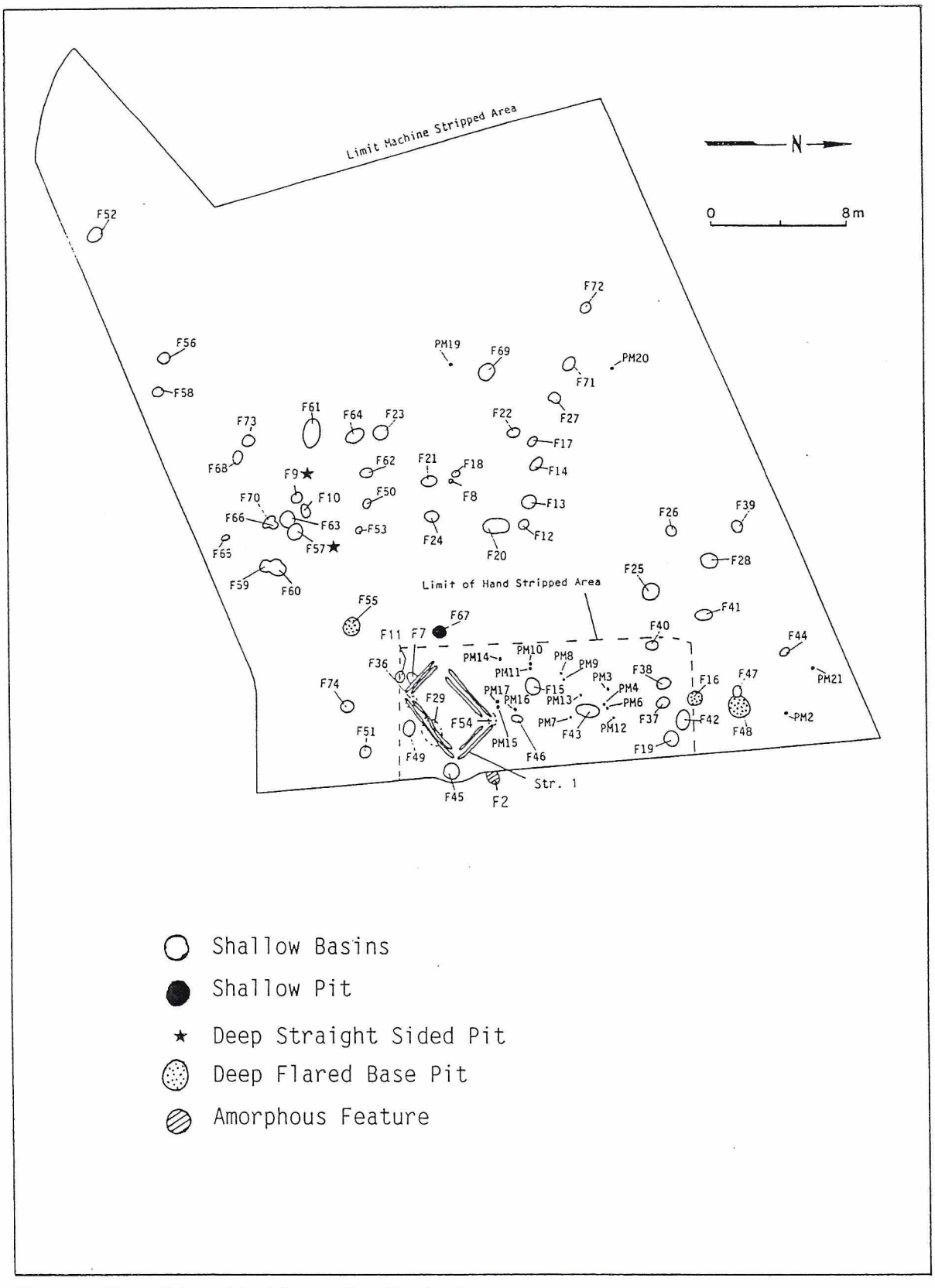


Figure 20. Distribution of pit feature types.

features, and the small amount of discarded material contained within the features at the Lightfoot site is in direct contrast to the Late Woodland community patterns exhibited at the Jamestown site (21C4-14), which was located less than 300 m north of the Lightfoot site. Late Woodland community patterns at the Jamestown site were highly structured, with pit feature clusters and structures distributed in a circular pattern around the perimeter of an open area, the center of which was marked by at least two large posts (Wagner 1986b). Most of the deep features exhibited evidence of in situ burning and were filled with a very dark midden containing abundant cultural debris in contrast to the almost culturally sterile silty clay fill of the deep features at the Lightfoot site. One possible interpretation is that the Lightfoot site and the Jamestown site represent different site types within the local Late Woodland settlement system. The Jamestown site may represent a semipermanently or permanently occupied base camp that is the focus of human activity on a year-round basis during the earlier part (A.D. 450-800) of the Late Woodland period while the Lightfoot site, with its low material frequency and restricted lithic tool inventory, could represent a special activity site or seasonal camp. Individuals or small groups may have left larger sites, such as the Jamestown site, on a periodic basis to occupy smaller sites like the Lightfoot site to exploit seasonal resources such as nut crops. The Late Woodland community plan at the Lightfoot site may have been formed by a series of short-term occupations with no discrete activty areas or feature clusters present.

CHAPTER IV. CERAMIC ANALYSIS

Mark J. Wagner

Introduction

A total of 992 sherds was recovered from the excavation units, pit features, structure 1 wall trenches, and post molds at the site. Grit and grog-tempered Late Woodland ceramics comprised the majority of the assemblage (n=894; 90.1%). Three partial vessels--a noded recurved jar and two restricted orifice jars--were recovered from pit features. Crab Orchard ceramics (n=57; 6.3%) were recovered from the plow zone, subplow zone horizons, Late Woodland pit features, and from a Crab Orchard basin (feature 45). Shell and grog tempered Mississippian ceramics (n=40) were recovered from the plow zone and subplow zone cultural horizons.

The objectives of the ceramic anlysis were to provide a complete description of the three ceramic types present at the site; to compare the Late Woodland and Mississippian ceramic assemblages with those from other sites in the project area; and to compare the Late Woodland ceramic assemblage with ceramic assemblages from the American Bottom, Kaskaskia, and Big Muddy River drainages. Regional comparison of the Crab Orchard and Mississippian ceramics was not attempted because of the limited size of the Lightfoot site collection. One hundred percent of the ceramic assemblage was identified as to surface treatment and temper. Temper was identified macroscopically. Color descriptions were subjectively determined unless the description is prefixed by a Munsell color notation. A sample consisting of all Crab Orchard and Late Woodland ceramics over 25 mm in diameter from a feature context was measured for wall thickness, and all of the small Mississippian assemblage was examined.

Type 1: Crab Orchard

Crab Orchard ceramics occur in Early to Middle Woodland contexts in southern Illinois (Hargrave 1982:1235-1238; Maxwell 1951; McNerney 1975; Woods and Denny 1980). This ceramic type can be distinguished from grit/grog-tempered Late Woodland ceramics on the basis of the much larger temper size, thicker vessel walls, an orange to buff exterior surface color, and fabric impressions on some sherds. Temper size is usually large and includes crushed rock, chert, and sherds. Three surface treatments have been defined: plain, cordmarked, and fabric impressed. Both fabric-impressed and cordmarked ceramics have been

recovered from other sites in Burning Star Mine #4. Stephens (1975:267) noted that plain surfaced ceramics are actually cordmarked or fabric-impressed sherds on which the original surface treatment has been destroyed by smoothing. The Crab Orchard ceramics from the Lightfoot site included all three types--plain, fabric impressed, and cordmarked--previously defined in southern Illinois.

Crab Orchard ceramics were recovered in small quantities from four other sites with Late Woodland and Mississippian occupations (21C4-9, 14, 34, 46) located north of the confluence of Bonnie, Galum, and Rock Fork creeks; from site 21C4-27, a predominantly Archaic/Early Woodland site south of the confluence of the three creeks; and from site 21C4-132, an Archaic through Woodland nut collecting/hunting camp located in the upper reaches of Bonnie Creek. Crab Orchard occupations at these sites are very light, with the basin (feature 45) at the Lightfoot site being the single Crab Orchard pit feature identified in the mine. The slight Crab Orchard occupation at the Lightfoot site is consistent with the pattern observed in the mine as a whole.

Fifty four body sherds and three rims were identified as Crab Orchard ceramics. Recovery contexts included the plow zone (n=22), midden (n=6) and pit features (n=29). Within the midden, one sherd was recovered from 20-30 cm bs, four from 40-50 cm bs, and one from 40-50 cm bs. Eight sherds were recovered as intrusive artifacts in Late Woodland features, and 13 were recovered from feature 45, a small basin located to the east of structure 1. Recognizable surface treatments included three cordmarked (type 1b), two plain (type 1a), and one fabric impressed (type 1c) sherd. The remainder of the assemblage consisted of eroded sherds (type 1d) on which it was impossible to determine the original surface treatment. Exterior sherd color varied from orange to buff, with orange the predominant color. Core colors varied from orange to buff to black with orange the predominant color. Interior surface colors in order of frequency were orange, buff, black, and gray. Temper consisted of crushed igneous/metamorphic rock and grog with very small pieces of limestone present in some sherds. Many of the sherds have a gritty texture, suggesting that sand is also present as a tempering agent. Temper size was not systematically recorded but appeared to be coarse, with some igneous/metamorphic rock fragments approaching 5 mm in size. Sherd thickness (based on a sample of 17 complete sherds) ranged from 4.3 mm to 14.1 m with a mean of 8.7 mm.

Three rims from three separate vessels were recovered (Table 11; Figure 21). Vessel shape and orifice diameter were indeterminable because of the small size of the rims. Two rims had rounded lips with exterior vertical cordmarking extending up to but not over the lip. One rim is slightly outslanting and may have been from a small, restricted orifice jar (Figure 21b). A very crude rim with a thickened, irregular lip that may be from a jar was recovered from feature 20 (Figure 21c).

Type II: Late Woodland (n=894)

Late Woodland ceramics were recovered from the plow zone (n=260),

Table 11. Rim Observations.

Provenience	Vessel Type	Temper: Shell	Grog	I/M	Shale	Limestone	Thickness: Max. (mm)	Min. (mm)	Mean (mm)	Orifice Diameter (cm)	% Rim	Color: Ext.	Int.	Core	Surface Treatment: CM	Plain	Indeterm.	Node Size (mm)	Distance Below Lip (mm)	Lip Shape	Lip Treatment	Cult. Affil.
U16 PZ	Unknown				x		3.7	3.7	3.7	-	-	Blk.	Blk.	Blk.			x			Flat	Notched	LW
U31 PZ	Unknown	x	x	x			6.9	8.6	7.75	-	-	Brn.	Buff	Buff		x				Rounded	Plain	MS
F7	Unknown		x	x			3.9	4.7	4.3	-	-	Blk.	Buff	Buff	x					Rounded	Notched	LW
U26 PZ	Unknown		x	x			3.3	5.0	4.15	-	-	Buff	Blk.	Blk.	x			6	7	Flat	Plain	LW
F13	Small jar/bowl		x	x		x	4.3	6.5	5.4	14	7	Brn./ Blk.	Blk.	Blk.	x					Rounded/ Flat	Plain	LW
F13	Jar (?)			x		x	5.2	5.7	5.45	10	30	Brn.	Org.	Blk.	x			10	11	Rounded	Plain	LW
F15	Jar		x	x		x	3.9	6.8	5.35	24	7	Blk.	Gray	Gray	x			6	8	Flat	Plain	LW
F16	Unknown		x	x			4.0	5.0	4.5	-	-	Blk.	Buff	Org.	x					Flat	Plain	LW
F28	Unknown			x			3.6	4.5	4.05	-	-	Blk.	Blk.	Gray	x					Flat	Plain	LW
F41	Jar		x	x			5.3	6.0	5.65	-	-	Buff	Buff	Org.			x			Rounded	Plain	CO
F47	Unknown			x			3.5	4.0	3.75	-	-	Blk.	Blk.	Blk.	x					Rounded	Notched	LW
F20	Unknown		x	x			8.6	10.9	9.75	-	-	Org.	Org.	Buff			x			Rounded	Plain	CO
F48	Unknown		x	x			4.9	7.5	6.2	-	-	Gray	Gray	Gray			x			Rounded	Plain	LW
F49	Unknown		x	x			5.3	5.9	5.6	-	-	Org.	Org.	Org.	x					Rounded	Plain	CO
F49	Unknown		x	x			3.5	4.3	3.9	-	-	Blk.	Blk.	Blk.	x			7	9	Flat	Plain	LW
F66	Small jar/bowl		x	x			5.0	5.2	5.1	14	11	Blk.	Blk.	Blk.	x					Flat	Plain	LW
F70			x	x		x	4.6	6.0	5.3	18	17	Buff/	Gray	Blk.	x					Flat	Plain	LW

LW - Late Woodland
MS - Mississippian
CO - Crab Orchard

Figure 21. Crab Orchard and Late Woodland Rim Profiles

Crab Orchard

a. Unknown vessel type, feature 66

b. Jar (?) rim, feature 41

c. Jar (?) rim, feature 20

Late Woodland

d. Superior lip notched, feature 16

e. Interior/superior lip slashed, feature 7

f. Interior slashed/external lip protusion, unit 31 (20-30 cm bs)

g. Superior lip impressed/external lip protrusion, feature 47

h. Interior lip dowel impressed, unit 6 plow zone

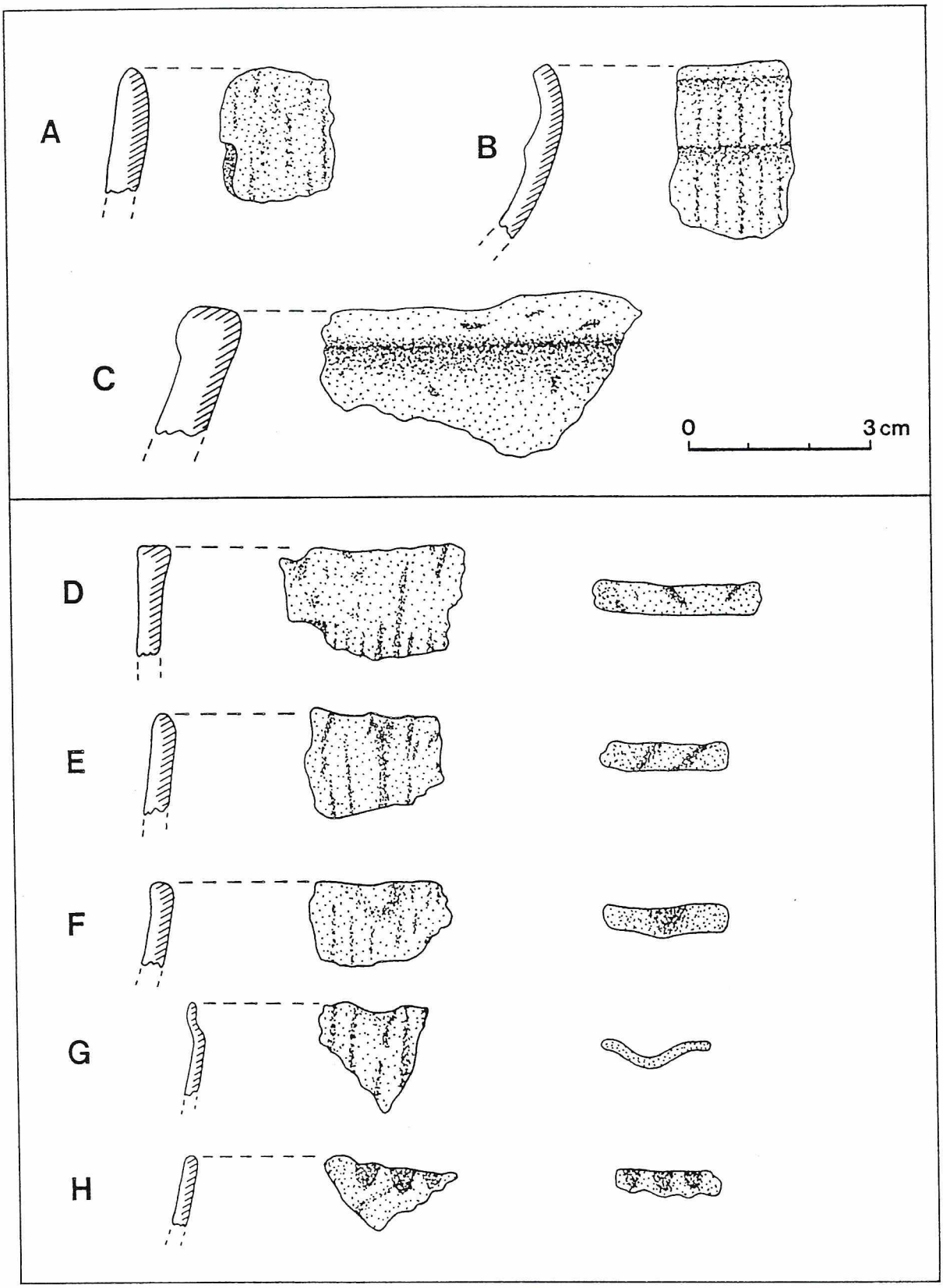


Figure 21. Crab Orchard and Late Woodland rim profiles.

midden (n=52), pit features (n=557), and post molds (n=25) at the Lightfoot site. Within the midden, 35 sherds were recovered from 20-30 cm bs and 16 from 30-40 cm bs. Thirteen rims representing at least 12 separate vessels were present at the site. In addition, large body sections with no associated rims that may represent two additional vessels were recovered from features 16 and 22.

A sample comprised of all body sherds 25 mm or greater in diameter from a pit feature context was examined for wall thickness, surface treatment, color, and temper (Table 12). A single radiocarbon date of 1370±70 B.P. (A.D. 580±70) was obtained on a shallow pit (feature 67) containing 21 Late Woodland body sherds. Vessel wall thickness ranged from a minimum of 2.7 mm to a maximum of 9.0 mm. Cordmarking was the dominant surface treatment with only one plain sherd identified. The majority of the cord impressions are shallow and thick, ranging in width from 1-5 mm. Exterior surface color was highly variable and included buff, orange, brown, and black (Table 12). Interior surface colors were more consistent, with black and gray being the predominant colors. Core colors were observed but in most cases simply represented a gradation in color betwen the exterior and interior vesel surfaces. Color does not appear to be a useful attribute in examining the Late Woodland ceramic assemblage at the site as examination of the larger vessel body sections revealed that black, orange, gray, and other colors were present on the interior and exterior surfaces of the same vessel. For example, a jar from feature 15 had a black exterior neck and upper body section, while the lower body section was orange with black firing clouds. The interior surface color of this same vessel varied from orange to black. Similarly, a small jar section from feature 13 had a dark brown exterior with black firing clouds and an interior surface color that varied from gray to black.

Crushed igneous/metamorphic rock and grog were the predominant temper types (Table 12). Crushed rock was observed in 102 (68%) of the sample sherds while grog was noted in 126 (84%). These two temper types are not exclusive but occur in combination with each other. Limestone was present in 12 (8%) of the sherds but always as one or two tiny fragments and probably represents an accidental inclusion. Shale and quartz were also present as minor tempering agents. Temper size was almost evenly distributed between fine (0 to 2 mm) and coarse (2 to 4 mm) (Table 12).

Vessel types consisted only of inslanted and recurved restricted orifice jars (Figures 22 and 23; Table 11). A recurved jar with a flat lip and a short neck was recovered from feature 15 (Figure 22a). A single row of interior punched nodes spaced approximately 5 to 10 mm apart was located approximately 7 mm below the vessel lip. Vertical cordmarking is present on the vessel exterior with the cordmarking extending onto the top of the vessel lip. Temper consisted of crushed igneous/ metamorphic rock and grog with a small amount of limestone. Vessel orifice diameter was 24 cm.

Sections of four restricted orifice jars were recovered from features 13, 66, and 70 (Figure 23). Three are unnoded small jars with

Table 12. Ceramic Data, Late Woodland Body Sherds.

Feature	Color: Ext.	Color: Int.	Color: Core	Thickness: Min. (mm)	Thickness: Max. (mm)	Thickness: Mean (mm)	Surface Treatment	Temper: Shell	Temper: I/M	Temper: Shale	Temper: Qtz	Temper: Mica	Temper: LS	Temper: Grog	Temper Size
7	Orange/ Gray	Gray	Gray	4.0	4.3	4.15	Cordmarked		x		x		x	x	Fine
	Black	Black	Gray	3.7	4.1	3.90	Cordmarked		x				x		Fine
	Buff	Black	Buff	4.4	4.6	4.50	Cordmarked		x				x	x	Coarse
	Buff	Black	Black	5.5	5.8	7.65	Cordmarked		x					x	Coarse
	Buff	Buff	Black	4.2	4.9	4.55	Cordmarked		x		x			x	Coarse
	Buff	Gray	Gray	5.2	5.5	5.35	Cordmarked		x					x	Coarse
	Buff	Black	Black	5.0	5.3	5.15	Cordmarked		x					x	Coarse
	Buff	Black	Black	4.7	5.0	4.85	Cordmarked		x					x	Coarse
	Orange	Black	Black	3.5	3.6	3.55	Cordmarked		x					x	Coarse
	Buff	Gray	Black	3.3	4.0	3.65	Cordmarked		x		x			x	Coarse
	Buff	Buff	Buff	3.4	3.5	3.45			x					x	Coarse
10	Gray	Gray	Gray	3.1	3.1	3.10	Cordmarked		x			x	x	x	Fine
11	Buff	Black	Black	5.4	6.3	5.85	Cordmarked		x		x			x	Fine
	Buff/ Gray	Black	Black	4.6	4.8	4.70	Cordmarked		x					x	Fine
	Buff	Black	Black	4.4	4.6	4.50	Cordmarked		x					x	Coarse
	Buff	Black	Black	4.1	4.7	4.40	Cordmarked		x					x	Coarse
12	Buff	Black	Black	4.1	6.6	5.85	Cordmarked		x		x		x	x	Fine
13	Black	Black	Black	4.0	4.3	4.15	Cordmarked		x						
	Orange/ Gray	Black	Black	4.5	5.4	4.45	Cordmarked			x			x		Coarse
	Gray	Gray	Gray	3.8	5.0	4.40	Cordmarked						x		
	Black	Black	Black	3.2	3.3	3.25	Cordmarked		x	x			x		Coarse
	Black	Black	Black/ Orange	3.1	3.5	3.30	Cordmarked		x				x	x	Fine
	Buff/ Black	Black	Black	4.8	4.8	4.80	Cordmarked						x	x	Coarse
	Buff	Buff	Buff	4.4	5.0	4.70	Cordmarked						x		Coarse
	Buff	Black	Gray	3.6	3.6	3.60	Cordmarked				x				Fine
	Buff	Black	Buff/ Black	3.3	3.3	3.30	Cordmarked				x				Fine
	Orange	Orange	Orange	3.2	3.7	3.45	Cordmarked		x				x		Fine
15	Black	Black	Black	4.6	4.6	4.60	Cordmarked		x		x		x	x	Fine
	Buff/ Orange	Black	Orange/ Black	4.4	5.3	4.85	Cordmarked		x				x	x	Coarse
16	Buff/ Black	Black	Black	4.0	4.8	4.40			x					x	Coarse
	Buff/ Black	Black	Black	4.7	5.0	4.85	Cordmarked		x		x			x	Coarse

Table 12. (Cont'd.)

Feature	Color: Ext.	Color: Int.	Color: Core	Thickness: Min. (mm)	Thickness: Max. (mm)	Thickness: Mean (mm)	Surface Treatment	Temper: Shell	Temper: I/M	Temper: Shale	Temper: Qtz	Temper: Mica	Temper: LS	Temper: Grog	Temper Size
16	Buff/ Black	Black	Black	4.1	4.2	4.15	Cordmarked		x	x				x	Coarse
	Buff/ Black	Black	Black	3.9	4.2	4.05	Cordmarked		x	x				x	Coarse
	Black	Black	Black	5.1	5.3	5.20	Cordmarked		x		x			x	Coarse
	Gray	Black	Black	5.4	5.4	5.40	Cordmarked		x		x			x	Coarse
	Buff	Black	Buff/ Black	5.0	5.8	5.40	Cordmarked		x		x			x	Coarse
	Black	Gray	Orange/ Gray	3.0	3.4	3.2	Cordmarked		x						Fine
	Buff	Black	Black	4.1	4.2	4.15	Cordmarked		x					x	Fine
	Black	Black	Black	3.0	3.3	3.15	Cordmarked		x					x	Fine
	Buff/ Black	Black	Black	4.1	4.7	4.40	Cordmarked				x			x	Fine
	Black	Black	Black	4.1	4.3	4.20	Cordmarked		x		x			x	Fine
	Gray	Gray	Gray	3.6	4.0	3.80			x	x	x			x	Fine
	Buff	Black	Gray	4.0	4.4	4.20	Cordmarked		x	x					Fine
	Buff/ Black	Black	Black	3.3	3.9	3.60	Cordmarked		x					x	Fine
	Orange	Gray	Gray	3.7	4.0	3.85	Cordmarked		x	x				x	Fine
	Orange	Gray	Gray	4.2	4.4	4.30	Cordmarked		x	x				x	Coarse
19	Black	Black	Black	3.3	3.4	3.35	Cordmarked		x					x	Fine
	Buff	Black	Buff/ Black	5.4	6.0	5.70	Cordmarked			x					Fine
	Orange	Gray	Orange/ Gray	3.1	3.1	3.10	Cordmarked			x					Fine
	Orange	Gray	Gray	3.1	4.2	3.65	Cordmarked		x	x					Fine
	Orange/ Brown	Black	Orange/ Black	3.5	3.8	3.65	Cordmarked		x	x					Fine
	Orange/ Brown	Brown	Orange/ Brown	5.1	5.3	5.20	Cordmarked		x	x	x			x	Coarse
20	Gray/ Brown	Black	Brown/ Black	3.0	3.3	3.15	Cordmarked				x			x	Fine
	Gray/ Brown	Black	Brown/ Black	3.0	3.3	3.15	Cordmarked				x			x	Fine
	Gray/ Brown	Black	Brown/ Black	3.3	3.8	3.55	Cordmarked				x			x	Fine
	Orange	Brown	Orange/ Black	4.7	4.7	4.70	Cordmarked		x					x	Coarse
22	Buff/ Black	Black	Black	3.8	4.2	4.00	Cordmarked		x					x	Fine

Table 12. (Cont'd.)

Feature	Color: Ext.	Color: Int.	Color: Core	Thickness: Min. (mm)	Thickness: Max. (mm)	Thickness: Mean (mm)	Surface Treatment	Temper: Shell	Temper: I/M	Temper: Shale	Temper: Qtz	Temper: Mica	Temper: LS	Temper: Grog	Temper Size
23	Black	Black	Black	3.7	4.2	3.95	Cordmarked		x		x			x	Coarse
24	Black	Black	Orange	5.0	5.2	5.10	Cordmarked		x						Fine
	Orange	Orange	Orange	3.3	3.9	3.60	Cordmarked		x	x					Coarse
25	Black	Black	Black	4.2	5.0	4.60	Cordmarked		x					x	Fine
	Orange/ Gray	Gray	Black	5.5	6.4	5.95	Cordmarked		x						Fine
27	Buff	Gray	Gray	4.2	4.6	4.40	Cordmarked			x					Fine
	Buff	Black	Orange	6.0	6.5	6.25	Cordmarked		x	x					Coarse
	Buff	Black	Orange	6.1	6.3	6.20	Cordmarked			x				x	Coarse
	Buff/ Black	Black	Black	4.4	4.5	4.45	Cordmarked		x	x				x	Coarse
	Buff/ Orange	Buff	Buff	4.4	5.1	4.75	Cordmarked		x	x				x	Fine
	Gray	Gray	Gray	3.9	3.9	3.90	Cordmarked			x				x	Coarse
	Orange	Gray	Gray	3.5	4.0	3.75	Cordmarked		x					x	Fine
	Buff	Gray	Gray	5.0	5.5	5.25	Cordmarked			x				x	Fine
	Orange	Gray	Gray	3.9	4.8	4.35	Cordmarked		x						Fine
28	Orange/ Black	Buff	Orange/ Black/Buff	6.0	6.3	6.15	Cordmarked		x		x				Coarse
39	Gray	Black	Gray	4.5	4.7	4.60	Cordmarked		x	x					
40	Buff/ Black	Black	Black	3.2	4.3	3.85	Cordmarked		x					x	Fine
	Buff/ Orange	Gray	Buff/ Black	5.3	6.1	5.70	Cordmarked		x	x					
	Buff	Buff/ Gray	Gray	5.5	7.6	6.75	Cordmarked			x					
	Buff	Orange	Buff/ Orange	5.9	6.6	6.75	Cordmarked		x	x	x			x	Coarse
40	Buff	Orange	Gray/ Orange	5.3	5.5	5.40	Cordmarked		x	x					Coarse
	Buff/ Black	Black	Gray	3.0	3.8	3.40	Cordmarked			x	x				Fine
	Black	Black	Black	5.5	6.4	5.95	Cordmarked		x					x	Fine
	Black	Black	Orange	5.3	5.3	5.30	Cordmarked		x	x				x	Fine
	Black	Black	Black	5.9	6.0	5.95	Cordmarked			x				x	Coarse
	Buff	Black	Black	5.8	6.4	6.10	Cordmarked			x	x			x	Coarse
	Buff	Orange	Gray/ Orange	5.0	5.3	5.15	Cordmarked		x		x			x	Fine
	Buff	Orange	Buff/ Orange	5.9	6.1	6.00	Cordmarked		x	x	x			x	Fine
	Gray	Gray	Gray	4.3	5.3	4.80	Cordmarked		x		x			x	Coarse

Table 12. (Cont'd.)

Feature	Color: Ext.	Color: Int.	Color: Core	Thickness: Min. (mm)	Thickness: Max. (mm)	Thickness: Mean (mm)	Surface Treatment	Temper: Shell	Temper: I/M	Temper: Shale	Temper: Qtz	Temper: Mica	Temper: LS	Temper: Grog	Temper Size
41	Orange	Black	Black	3.9	4.0	3.95	Cordmarked				x			x	Fine
42	Buff	Black	Gray	4.5	4.7	4.60	Cordmarked				x			x	Coarse
45	Buff	Black	Black	4.3	4.4	4.35	Cordmarked							x	Fine
46	Buff	Buff	Gray	7.0	7.7	7.35	Unknown		x						Fine
47	Buff	Black	Black	3.3	4.8	4.10	Cordmarked			x				x	Fine
	Buff/ Black	Black	Black	3.3	3.4	3.35	Cordmarked		x					x	Fine
48	Buff/ Gray	Gray	Buff/ Gray	4.5	5.7	5.10	Cordmarked		x						Fine
	Buff/ Black	Black	Buff Black	3.1	7.6	5.35	Cordmarked		x		x			x	Fine
	Buff/ Gray	Black	Black	4.1	4.6	4.35	Cordmarked				x				Fine
	Gray	Black	Black	4.9	5.7	5.30	Cordmarked			x				x	Fine
	Buff	Buff	Gray	5.0	5.1	5.10	Cordmarked			x				x	Fine
	Buff	Buff	Gray	3.3	3.7	3.50	Cordmarked							x	Fine
	Buff	Black	Buff/ Black	5.1	5.2	5.15	Cordmarked							x	Fine
49	Buff	Buff	Buff	8.3	9.0	8.65	Cordmarked			x				x	Coarse
	Brown	Black	Orange	5.4	5.5	5.45	Cordmarked		x	x				x	Fine
	Orange	Buff	Orange	5.5	7.5	6.50	Cordmarked				x			x	Coarse
	Buff	Buff	Gray	3.9	4.1	4.00	Cordmarked			x				x	Fine
	Gray	Black	Orange	4.7	5.9	5.30								x	Coarse
54	Black	Black	Orange	3.5	3.6	3.55	Cordmarked		x	x	x			x	Coarse
56	Brown	Gray	Gray	4.2	4.9	4.45	Cordmarked		x	x	x				Coarse
	Buff	Gray	Orange	3.2	4.0	3.60	Cordmarked		x	x	x			x	Coarse
	Orange	Black	Gray	4.1	4.1	4.10	Cordmarked		x	x	x			x	Coarse
57	Black	Org./ Red	Orange	4.2	5.4	4.80	Cordmarked		x					x	Coarse
	Brown	Black	Orange	5.9	6.0	5.95			x					x	Coarse
61	Gray	Black	Gray	5.6	7.0	6.30	Cordmarked		x				x	x	Coarse
	Gray	Black	Gray	4.9	6.7	5.80	Cordmarked						x		Fine
	Gray	Gray	Gray	4.7	5.0	4.85	Cordmarked							x	Fine
	Gray	Black	Gray	4.1	5.9	4.50	Cordmarked			x				x	Fine
	Gray	Black	Gray	5.6	5.6	5.60	Cordmarked			x				x	Coarse
	Gray	Black	Gray	4.4	5.0	4.70	Cordmarked			x			x	x	Fine
	Gray	Gray	Gray	4.6	4.6	4.60	Cordmarked								Fine
	Buff	Gray	Gray	4.0	4.4	4.20	Cordmarked			x					Fine
	Buff	Black	Orange	7.2	8.0	7.60	Cordmarked								Fine
62	Gray	Gray	Gray	4.0	4.4	4.20	Cordmarked								Coarse
63	Buff	Black	Black	6.0	6.3	6.15			x	x	x			x	Fine

Table 12. (Cont'd.)

Feature	Color: Ext.	Color: Int.	Color: Core	Thickness: Min. (mm)	Thickness: Max. (mm)	Thickness: Mean (mm)	Surface Treatment	Temper: Shell	Temper: I/M	Temper: Shale	Temper: Qtz	Temper: Mica	Temper: LS	Temper: Grog	Temper Size
66	Buff/ Brown	Black	Black	4.3	6.2	5.25			x					x	Fine
	Buff	Black	Black	5.2	5.8	5.50			x					x	Fine
	Brown	Buff	Buff	6.0	6.6	6.30			x						Fine
67	Buff	Black	Black	3.9	4.0	3.95	Cordmarked			x				x	Fine
	Buff	Black	Black	3.0	3.6	3.30				x	x			x	Fine
	Buff/ Orange	Orange	Buff	3.3	4.1	3.70			x	x	x			x	Coarse
	Buff	Black	Black	5.0	5.5	5.25				x				x	Fine
	Black	Black	Buff	6.0	6.6	6.30				x					Fine
	Buff/ Orange	Orange	Buff	4.2	4.9	4.95			x	x	x			x	Fine
	Buff	Black	Buff	5.0	5.3	5.15			x	x	x			x	Fine
69	Buff/ Brown	Black	Gray	4.0	4.6	4.30			x					x	Coarse
	Buff/ Brown	Black	Orange	3.8	4.4	4.20			x					x	Fine
	Buff	Gray	Buff	4.7	5.0	4.85			x					x	Fine
	Buff/ Black	Black	Black	3.2	4.2	3.70			x					x	Fine
	Buff/ Brown	Gray	Black	2.7	3.7	3.20			x					x	Fine
	Gray	Black	Gray	5.3	6.4	5.85			x					x	Coarse
	Orange	Buff	Black	5.2	5.3	5.15			x					x	Fine
	Buff/ Black	Black	Black	2.9	3.3	3.10			x					x	Fine
	Buff/ Black	Black	Black	3.3	4.0	3.65			x					x	Fine
	Buff/ Brown	Black	Buff	5.0	5.6	5.30			x					x	Fine
	Brown/ Orange	Black	Black	3.3	3.8	3.55			x					x	Coarse
	Brown	Black	Orange	4.0	4.2	4.10			x					x	Fine
70	Buff/ Black	Buff	Buff	4.1	4.5	4.30			x		x			x	Fine
	Gray	Gray	Gray	3.8	4.3	4.05			x		x			x	Coarse

Figure 22. Late Woodland and Mississippian Rim Pofiles

Late Woodland

a. Noded recurved jar, feature 15

b. Noded restricted orifice jar, feature 13

c. Noded restricted orifice jar, unit 26 plow zone

d. Noded restricted orifice jar, feature 49

Mississippian

e. Everted rim jar, unit 31 plow zone

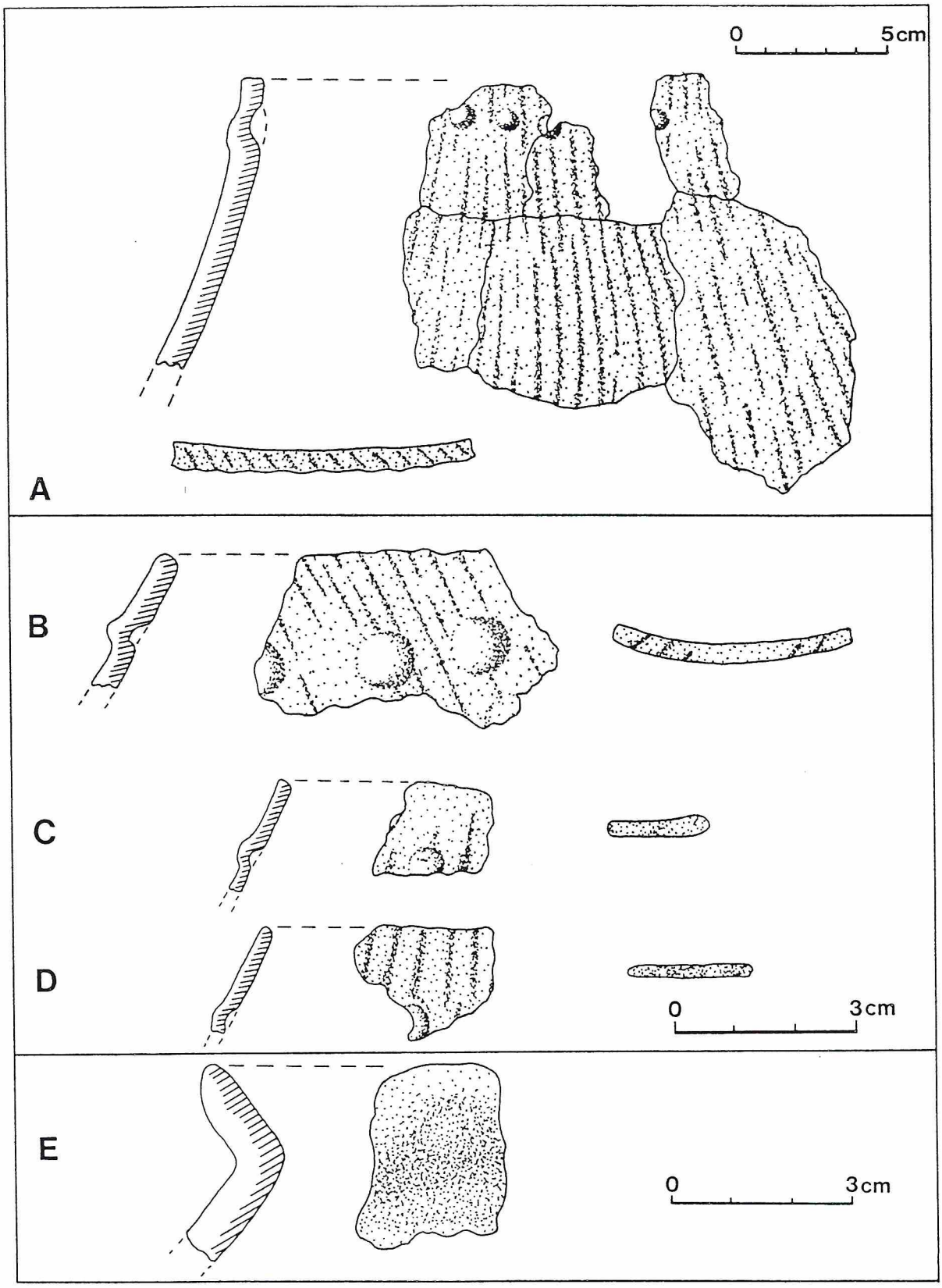


Figure 22. Late Woodland and Mississippian rim profiles.

Figure 23. Late Woodland Vessels

a. Restricted orifice jar, feature 66

b. Restricted orifice jar, feature 70

c. Restricted orifice jar, feature 13

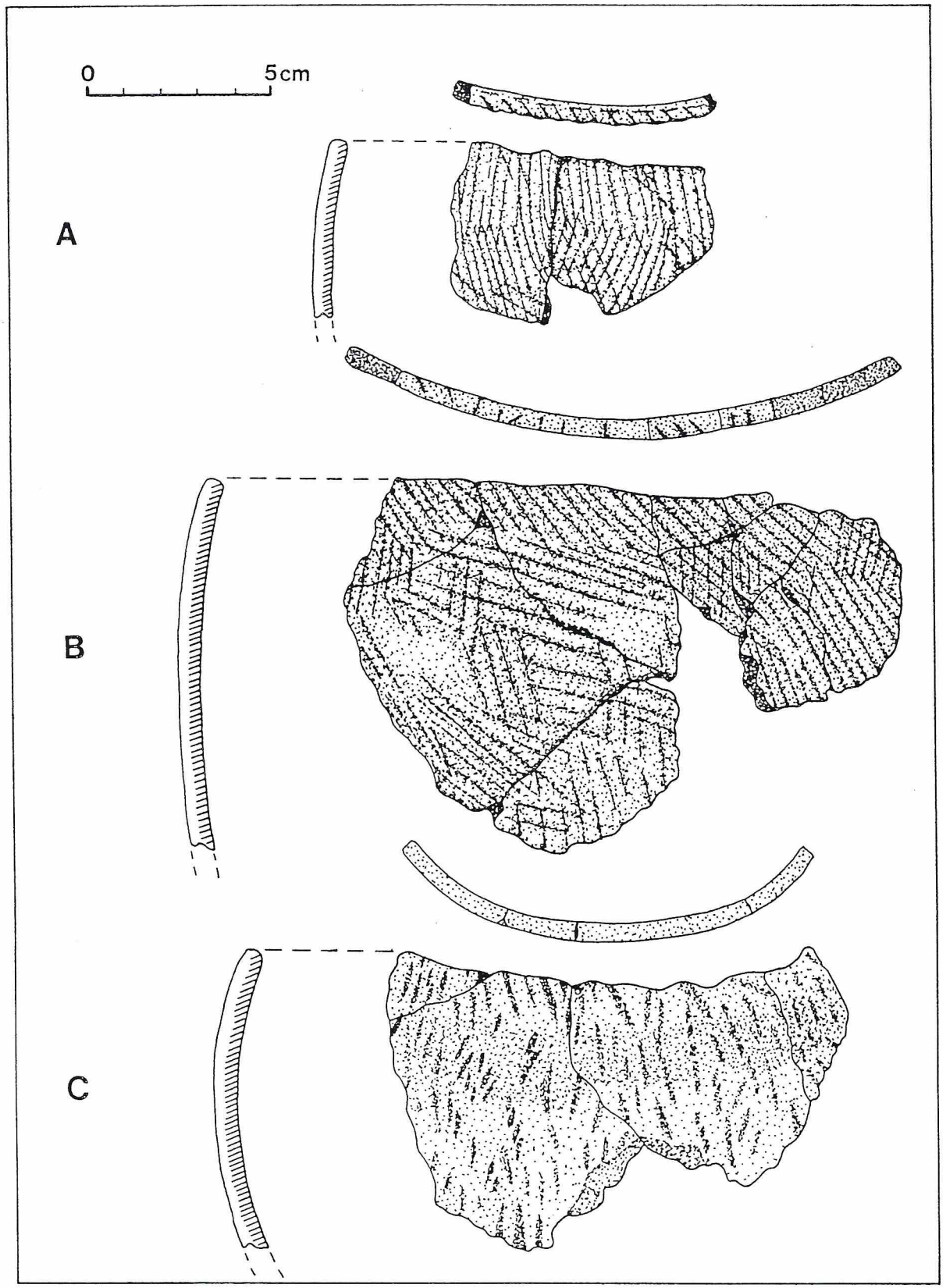


Figure 23. Late Woodland vessels.

orifice diameters of 14, 14, and 18 cm. The cordmarking is applied in a crisscross pattern on all three jars with the cordmarking extending onto the vessel lip of the feature 66 specimen (Figure 23a). The vessel lips were undecorated with lip shapes being rounded (n=1) and flat (n=2). The feature 13 and feature 66 jars increase rapidly in thickness from the vessel lip down to where they are broken, suggesting that the break is near the base of the vessel. Based on the curvature of the vessel wall and the thickness of the body sherds at the break, the feature 13 and feature 66 vessels must have been small jars with inslanting rims, probably no more than 15 cm in height. A restricted orifice jar with interior punched nodes was represented by three small rim fragments recovered from feature 13 (Figure 22b). The nodes are approximately 10 mm in diameter, are located in a single row approximately 10 mm below the vessel lip, and are separated from each other by 3 to 8 mm. The exterior vessel surface is coarsely cordmarked with the cordmarking approaching the vessel lip at an approximate 45° angle. Cordwrapped stick impressions also are present on top of the vessel lip.

In addition to the recurved and inslanted restricted orifice noded jars, small fragments of interior punched noded vessel rims were recovered from the unit 26 plow zone and from features 28 and 49 (Figure 22c-d). The feature 22 rim has a flat lip and may have been part of a recurved jar. The unit 26 and feature 49 specimens consist of very small cordmarked rim fragments with interior punched nodes and flat lips (Figure 22).

Five very small rim fragments with modified or decorated lips were recovered (Figure 21d-h). Vessel type could not be determined because of the small size of the rims. Two (Figure 21d-e) had diagonal slashes across the interior vessel lip while on two more (Figure 21f-g), the vessel lip was pinched or impressed from the interior, creating a slight protrusion on the exterior vessel lip. Finally, one small rim from unit 16 has a series of closely spaced interior lip impressions, possibly manufactured by using a small dowel, that have created a rippled impression on the exterior vessel lip. The proportion of decorated lips to nondecorated lips is 5:9, or 35.7%. The proportion of noded to unnoded rims is 6:14 or 42.9%. Excluding the rims that are simply too small to accurately determine if they were noded or not, however, changes the proportion of noded to unnoded rims to 5:4, or 55% noded rims.

Type 3: Mississippian (n=40)

Mississippian sherds were recovered from the plow zone (n=32) and from 20-30 cm (n=6), 30-40 cm (n=2), and 40-50 cm (n=1) below the surface. Subtypes included plain (n=12), cordmarked (n=10), and residual sherds (n=18). Fabric-impressed sherds were not recovered although fabric-impressed ceramics were recovered from the Galum Crossing site (21C4-29) at the northwest corner of the mine (Powell n.d.). Buff was the predominant exterior surface color, followed in decreasing order of frequency by gray, orange, and black. Buff and gray were also the most frequently occurring core and interior surface

colors. The high frequency of buff and gray sherds is a reflection of the badly weathered condition of the Mississippian sherds. Wall thickness (measured on a sample of 34 complete sherds) ranged from 3.0 to 6.6 mm with a mean of 5.1 mm. Shell was the predominant temper type, with shell present in all sherds, while grog was present as minor tempering agent in 25 sherds. Small fragments of shale and limestone were present in eight sherds but formed such a minor part of the temper that they probably represent accidental inclusions. One small rim was recovered (Figure 22e). Neither vessel height nor orifice diameter were determinable for this very small fragment of an everted rim jar. The vessel lip is rounded with faint traces of a brown to black film present on the exterior and interior lip surfaces.

The small size of the Lightfoot site Mississippian ceramic assemblage makes it difficult to determine its temporal placement. However, ceramic attributes associated with the collection, including shell and grog tempering, cordmarking, everted rim jars, and filmed jar surfaces, also were present at the Bonnie Creek site, a Mississippian homestead site dating to ca. A.D. 1200-1350 located less than 1 mi north of the Lightfoot site (Wagner 1986a).

Conclusions

The small size of the Crab Orchard and Mississippian ceramic assemblages makes it difficult to compare these collections with those from other sites in the mine or other parts of southern Illinois. Briefly stated, the Crab Orchard ceramics are identical in surface treatment, color, and temper to other specimens recovered at sites 21C4-9, 14, 27, 46, and 132 in the mine. As previously noted (Wagner 1986a:138), the occurrence of small quantitites of Crab Orchard ceramics at multicomponent sites is part of a recurring pattern at the sites in the upper Galum Creek valley. These sites were most likely utilized as transitory hunting and nut collecting camps at which a small amount of material was discarded and few subsurface features constructed.

The Mississippian ceramics are similar to those recovered from the Brune (21C4-3), Snake Tree Cemetery (21C4-9), Jamestown (21C4-14), Galum Crossing (21C4-29), Cutler (21C4-34), and Bonnie Creek (21C4-46) sites within the mine in terms of temper and surface treatment. Viewed as a group, the ceramic assemblages from these sites exhibit ceramic traits contemporaneous with the Moorehead (A.D 1150-1250) and Sand Prairie (A.D. 1250- 1400) phases of the American Bottom sequence (Milner et al. 1984:158-186). Attributes similar to those of the Moorehead phase include the predominance of angled over rolled and everted jar rims, red slipped jar lip interiors, and the predominance of curved over angular jar shoulders. Attributes similar to those associated with both the Moorehead and Sand Prairie phases include the use of cordmarking, presence of water bottles and incised plates, and popularity of bowls and pans.

In addition to the Lightfoot site, Late Woodland ceramics were recovered in large quantities from the Burning Star (21C4-3), Jamestown

(21C4-14), Galum Crossing (21C4-29), and Cutler (21C4-34) sites within the mine. Radiocarbon dates from three of these sites--Burning Star, Galum Crossing, and Jamestown--indicate that the Late Woodland occupation in the upper Galum Creek valley lasts from approximately A.D. 450-1000. Late Woodland ceramics from the Burning Star site (21C4-3) exhibit more variation than the Lightfoot site ceramics as regards vessel morphology and rim modification. This assemblage (n=1,147) was recovered from pit features and a structure within a small portion of the site as the site was being destroyed by strip mining. It is not known how representative the collection is of the site as a whole, but the recovered materials appear to span the entire Late Woodland period. Vessel types included jars, bowls, large shallow bowls and pans, and miniature untempered vessels (Pulcher 1974b:77-87). Jar types similar to those from the Lightfoot site included a coarsely cordmarked recurved jar with interior punched nodes (Pulcher 1974b:Plate 5d) and a noded restricted orifice jar with slanted cordmarking (Pulcher 1974b:Plate 5b). Jar types not present at the Lightfoot site included a globular bodied restricted neck jar with an everted unnoded rim (Pulcher 1974b:77; Plate 7g) and a large, coarsely cordmarked unnoded recurved jar very similar to the Lightfoot site jar except for the absence of nodes (Pulcher 1974b:Plate 5i). Another vessel type present at the Burning Star site that was not found at the Lightfoot site was the large shallow bowl or pan (Pulcher 1974b:84; Plate 5f). Vessels of this type date to the latter end of the Late Woodland period in the American Bottom (Kelly et al. 1984:119-122) and appear to have a similar placement in the upper Galum Creek valley. The Lightfoot and Burning Star site ceramic assemblages differ markedly in terms of rim modification, with the Burning Star site exhibiting a greater variety of modification. Documented lip treatments at the Burning Star site include the addition of appliqued nodes to the vessel lip; exterior and interior lip notching using a plain dowel; and cordwrapped dowel impressions on the interior vessel lip. Punctations were present below the vessel lip on the exterior surfaces of some jars. Ceramic artifacts included untempered anthropomorphic figurines, miniature vessels, ceramic disks, and a ceramic spoon or ladle (Pulcher 1974b:85, 87; Plate 7a, h-m).

The Jamestown site (21C4-14) was a circular Late Woodland community located less than 1/2 mi north of the Lightfoot site. Radiocarbon dates from pit features and structures at the site indicate that it was occupied throughout the Late Woodland period from ca. A.D. 450 to A.D. 1000. A variety of vessel forms was present at the site, including noded and unnoded restricted orifice recurved and necked jars, bowls, and miniature vessels. Rim modifications included interior, superior, and exterior lip impressions created with a smooth dowel; cordwrapped dowel impressions on the interior and superior vessel lip; appliqued nodes; and collared or folded rims on terminal Late Woodland Dillinger vessels. Ceramics from the radiocarbon dated features indicate that changes in Late Woodland vessel morphology and lip treatment occur over time. A radiocarbon date (unadjusted) of A.D. 450±50 was obtained on feature 238, a very deep refuse filled pit that contained fragments of ceramic vessels--coarsely cordmarked inslanting and recurved restricted orifice jars with large interior punched nodes and lip notching--

identical to those of the Lightfoot site. An early date of A.D. 450±110 also was obtained on feature 100, the internal hearth of a pit house structure that contained one noded and one notched rim. Assuming the dates are correct, they indicate that coarse cordmarking, large interior punched nodes, and the recurved and inslanting restricted orifice vessel types are associated with early Late Woodland occupations in the upper Galum Creek valley. Of particular interest is the absence of cordwapped dowel impressions on the noded vessel rims recovered at the site. Notching or slashing of the interior lips of these vessels does occur, but these impressions are always created with a plain dowel. The use of cordwrapped dowel impressions appears to be a late decorative technique in the area with cordwrapped impressions present on the interior lips of terminal Late Woodland Dillinger vessels at the Jamestown site. The recurved and inslanting noded and unnoded jars associated with the early Late Woodland occupation at the Jamestown site are gradually replaced or complemented by additional vessel types, including necked jars with fine vertical cord impressions and bowls. The association of cordwapped dowel impressions (and the absence of nodes) with Dillinger phase vessels in feature 593 at the Jamestown site indicates a replacement of nodes as a decorative technique in the latter part of the Late Woodland period. Based on the radiocarbon dated features, other late ceramic attributes include the appearance of appliqued nodes on jar vessel lips and the bowl vessel type by ca. A.D. 900-1,000 (Wagner 1986b).

Late Woodland ceramics also were recovered from the Galum Crossing (21C4-29) and Cutler (21C4-34) sites in the mine. Noded and unnoded recurved and incurved restricted orifice jars were present at the Galum Crossing site, but two vessel types--bowls and straight necked jars--interpreted as later vessel types were not identified. Similarly, no terminal Late Woodland Dillinger ceramics were recovered. Decoration included diagonal incised notching on the vessel lip, cordwrapped dowel impressions, and cord impressions on the the interior and top of the vessel lip. Based on average measured rim thickness of 5 mm, the Late Woodland occupation was suggested to date early in the Late Woodland period (Powell n.d.). The Cutler site (21C4-34) was a Late Woodland and Mississippian site located in a dense woods immmediately south of the Lightfoot site. The ceramic assemblage from this site has not yet been completely analyzed, but a cursory examination of the material indictates that nodes are completely absent, with vessel types including finely cordmarked necked jars with outslanting rims and large, shallow bowls and pans.

Regional Comparisons

The Lightfoot site ceramics are associated with the Late Woodland Raymond ceramic tradition of southern Illinois (Maxwell 1951). Vessel types associated with this ceramic tradition include straight-sided bowls, small constricted neck jars, and coconut shaped or constricted orifice jars. Nodes were a minority decorative treatment, with cordwrapped dowel impressions occurring on the interior vessel lip while plain dowel impressions can occur on both the interior and exterior vessel lips. Cordmarking is shallow and loose, with the cord impressions

often overlapping and running diagonally or vertically across the body of the vessel (Maxwell 1951:278-279).

Very little substantive information has been collected regarding Late Woodland ceramics in the Till Plains of southern Illinois since Maxwell's excavations at the Raymond site. Ceramics similar to those of the study area have been recovered at the Marty Coolidge (Kuttruff 1969; 1972) and Kingfish sites in the lower Kaskaskia River valley (Lopinot et al. 1982:86-87). Vessel types at the Marty Coolodge site included globular or conoidal jars with restricted necks, vertical walled vessels or beakers, and neckless globular jars. Decoration consisted of cordwrapped dowel impressions on the interior and exterior vessel rim, notches, and nodes (Kuttruff 1969:172-173). Decorative attributes associated with the Kingfish site ceramics include plain dowel impressed rims, cordwrapped dowel impressed rims, and noded and punctated sherds. Four of the five noded rims occurred in features originating the deepest in the site midden, with one of the features dated at A.D 570±80. Six of the seven plain notched rims occurred in features originating higher in the midden. Radiocarbon dates on these features ranged from A.D. 720±60 to A.D. 830±70. Lopinot et al. (1982:87) interpreted this as weak stratigraphic evidence of styles within the Late Woodland midden, with the transition from Middle to Late Woodland ceramics marked by a gradual disappearance of exterior decoration with exterior punctates among the first and plain dowel impressions among the last to go.

Late Woodland ceramics have been recovered from both survey and excavations in the Rend Lake area of the Big Muddy drainage (Pauketat et al. 1984; Wagner and McCorvie 1986; Woods and Denny 1980). These ceramics differ from those of the upper Galum Creek valley in terms of surface treatment and decoration. Only one noded sherd is mentioned in the survey reports from the area (Pauketat et al. 1984:30), while noded ceramics were not recovered from controlled excavations at two sites (RL-114 and RL-188) with Late Woodland components (Wagner and McCorvie 1986:97-101; 177-180). Decoration included dowel impressed interior and exterior vessel lips, lip notching or slashing, punctates, and stamping. Many of the rim sherds had smoothed exterior surfaces, a form of surface treatment poorly represented in the upper Galum Creek valley. Rend Lake is located approximately 45 mi due east of the study area. The dissimilarities in Late Woodland ceramics from these two relatively close areas is intriguing. A similar dissimilarity exists in regard to Mississippian ceramics from the two areas, with cordmarked ceramics being virtually absent at Rend Lake Mississippian sites while they occur at all Mississippian sites in Burning Star #4 mine (Wagner 1986a:140-142). Interpretation of the differences in ceramics between these two areas cannot be resolved until more information has been gathered, but they appear to indicate that both the Late Woodland and Mississippian ceramic complexes of the Galum Creek area are more similar to those of the American Bottom than they are to those of the upper Big Muddy River drainage. Late Woodland ceramics with attributes similar to those of the study area are associated with the early Late Woodland Rosewood (A.D. 300-450) and Mund (A.D. 450-600) phases of the American Bottom (Kelly et al. 1984:104-117). Ceramic attributes associated with the Rosewood phase that occur on Late Woodland ceramics in the upper Galum

Creek valley include nodes, punctates, and cordwrapped and plain dowel impressions. Rosewood phase ceramics also exhibit exterior lip stamping with a cordwrapped stick and smoothed over cordmarking (Kelly et al. 1984:Plate 17d-f), attributes not documented at the Burning Star #4 sites. Mund phase ceramics, however, exhibit many of the attributes recognized at the Lightfoot and other Late Woodland sites in the area, including a similarity in vessel types (restricted orifice jars, miniature vessels, and miniature bowls); decorative attributes including nodes, punctates, lip slashes, and lip stick impressions; and absence of smoothed over cordmarking as a surface treatment (Fortier et al. 1983:155-212; Kelly et al. 1984:133-116).

In sum, the Late Woodland ceramic assemblage from the Lightfoot site is interpreted as representing the early Late Woodland period in the study area. This interpretation is based on the similarity of the assemblage to those from other early Late Woodland sites in the Till Plains and the American Bottom; the association of Late Woodland ceramics at the site with a radiocarbon date of 1370±70 B.P. (A.D. 580±70); the recovery of noded ceramics identical to those of the Lihgtfoot site from features dating to the fifth and sixth century A.D. at the Jamestown site (21C4-14) in the study area; and the absence at the Lightfoot site of later vessel types (necked jars and large shallow bowls or pans) and ceramic attributes (folded rims and cordwrapped stick impressed lips) that are known to be present in the project area.

CHAPTER V. LITHIC ANALYSIS

Brad Koldehoff

Introduction

Lithic tools and debris are the most consistently preserved residue of extinct cultural systems. Differential preservation of lithic remains are rare, and despite certain cultural and noncultural site formation processes, a fairly complete record of the lithic tools and debris deposited by the inhabitants of a site can usually be recovered. It is this fact that imparts great interpretive potential to the "lithic record" of extinct cultural systems.

The Lightfoot site contains Archaic, Woodland, and Mississippian components. All lithic materials from the site were subjected to technological, functional, and source area analysis; however, lithics recovered in flotation samples were not analyzed except for tools. The identification and description of lithic industries, site activities, and lithic procurement strategies for each component were prime objectives. In addition, the regional context of each component was briefly examined. More attention was focused on the Late Woodland component because the majority of intact deposits at the site are attributed to this component. The regional affiliation of the Late Woodland occupation of the upper Galum Creek valley will be addressed in detail in a forthcoming report on the Jamestown site (21C4-14).

Research Orientation

Before presenting the results of analysis, it is important to outline and clarify some terms and concepts that were an integral part of the analysis and interpretation of the lithics from the Lightfoot site.

For this chapter, technology is defined as a society's general means of coping with its environment, which includes the procurement and processing of raw materials and the production and maintenance of tools and facilities. Technological analysis of stone tools examines the methods of tool production and maintenance and the order of their execution. Chert debitage is one of the principle bodies of data drawn upon in the technological analysis of chipped stone industries. Chipped stone tool production is a subtractive process that generates a continuum of distinctive byproducts (i.e., debitage and production failures), and these byproducts allow analysts to reconstruct reduction

sequences or production trajectories. Production is only one stage in the "life cycle" of lithic materials (Figure 24).

An industry is defined as "a manufacturing or productive enterprise focusing on a raw material and involving certain common means of processing that material" (Sheets 1975:372). With this concept of industry, it is easy to define a chipped stone, groundstone, or ceramic industry. More specific types of industries also can be delineated. For example, the chipped stone industry of a single culture could have contained several more discrete industries, e.g., biface industry, blade/core industry, and flake tool industry. A single industry often employs several production techniques. A technique is a particular method or set of procedures employed to produce a specific product or result. An example of a technique is the bipolar flaking method which is used to detach flakes from small cobbles or fragments of chert.

The final concept to be considered is the organization of technology. It can be defined as the way in which a culture or society designs its tools and structures tool production, use, and maintenance so that the tools can respond effectively to the demands placed upon them by society in its daily interaction with the environment (see also Binford 1977, 1978, 1979). Reconstructing the technological organization of a culture can act as a useful heuristic device, for it forces the analyst to consider a broad range of variables and their interrelationships. Some of the key variables or factors a society must take into account in the organization of its technology include: (1) types of raw materials available, (2) the distance to raw material sources, (3) the basic food getting strategies, (4) the seasonal availability and accessibility of biotic and mineral resources, (5) group mobility, and (6) social relations with neighboring groups (e.g., access to resources in adjacent territories via alliances and exchange).

The actual design and production of stone tools is a decision-making process, and several important variables must be considered: (1) tool portability, (2) raw material selection, (3) amount of time and energy expended in production, (4) tool flexibility in regard to function and recycling, and (5) the degree to which a tool should be designed for repeated maintenance and reuse. The concept of industry is advocated as the most convenient method of investigating how a culture organizes its technology.

Lithic Procurement

Source area analysis of all lithic tools and debris identified 10 chert types and several rock and mineral types. All artifacts were assigned to specific types on the basis of macroscopic characteristics with the assistance of an extensive type collection (Koldehoff 1986a). Descriptions of each raw material type are below, followed by a reconstruction of the "lithic landscape" of the upper Galum Creek drainage and a discussion of the lithic procurement strategies of each component at the Lightfoot site.

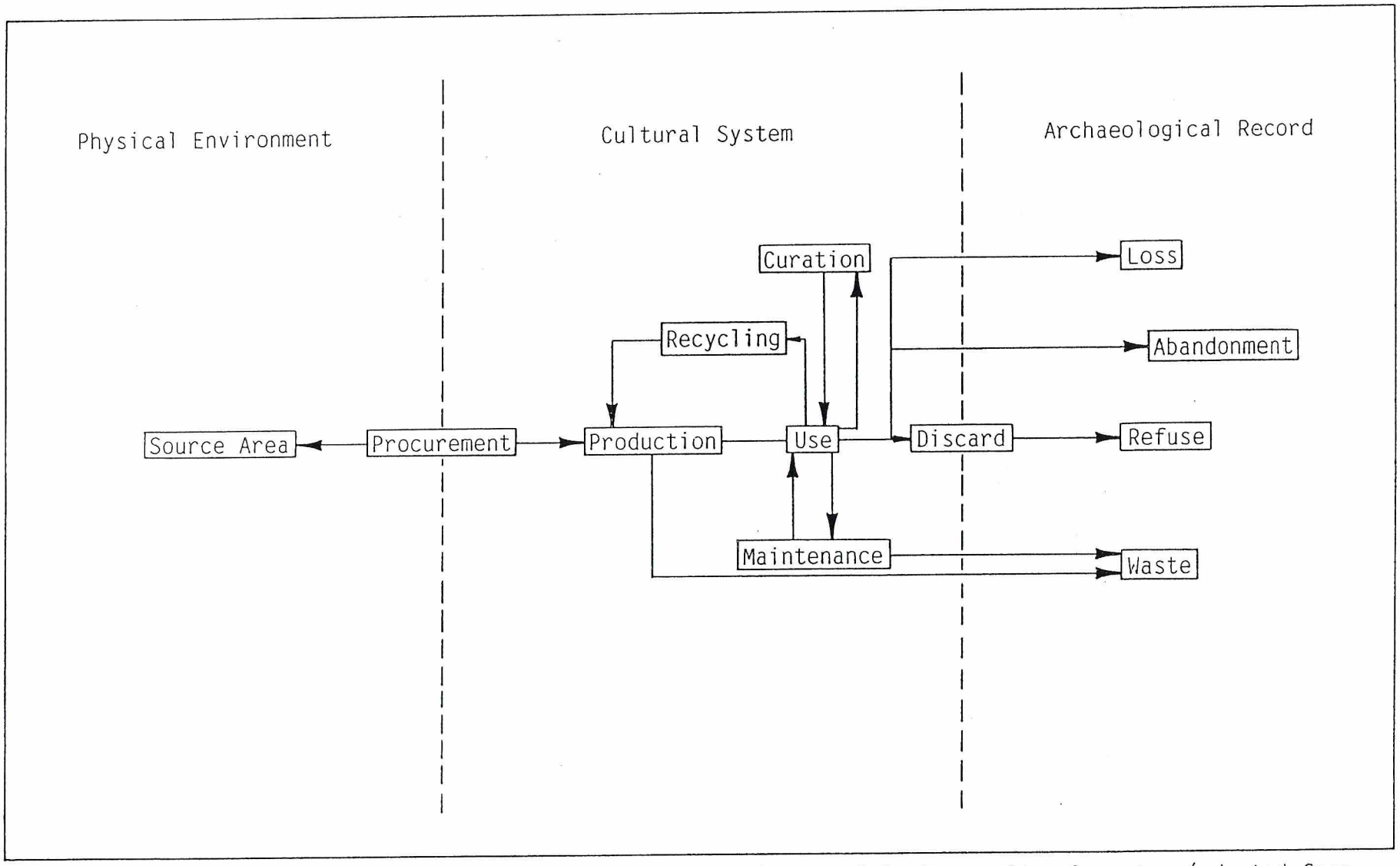


Figure 24. Simplified flow model of the life cycle of lithic materials in a cultural system (adapted from Schiffer 1972:Figure 1 and Gregg 1975:Figure 47).

Chert Types

Nine types were identified that have known source areas in southern Illinois and adjacent portions of Missouri (Figure 25). Chert artifacts that could not be assigned to a specific chert type were placed in an indeterminate category. Chert types from the entire site were quantified by weight to the nearest 0.5 g, and totals and percents by weight are shown in Tables 13 and 14. Only brief descriptions of each type are presented; more details can be found in several overviews on southern Illinois cherts (Koldehoff 1985b; May 1984; Spielbauer 1976).

Glacial Till. Deposits of glacial till south of Springfield, Illinois, predominantly belong to the Illinoian stage of Pleistocene glaciation. The southern extent of glaciation in Illinois is demarcated by the northern edge of the Shawnee Hills. The most common till unit in southern Illinois is the Glasford Formation (Willman and Frye 1970). It commonly contains pebbles and cobbles of chert as well as other rock types. Chert cobbles rarely exceed 10 cm in any dimension, usually possess a thin cortex which is often smoothed or polished, and the quality of the chert is generally low.

Table 13. Frequency of Chert Types.*

Chert Type	Geologic Formation	Weight in Grams	Percent by Weight
Glacial Till	Glasford	1640.5	42.0
Blair/St. David	St. David	877.5	22.4
Kinkaid	Kinkaid	473.0	12.1
Cobden/Dongola	St. Louis	157.5	4.0
Burlington	Burlington	77.0	1.9
Mill Creek	Salem	31.0	0.8
Kaolin	?	30.5	0.8
Ste. Genevieve	Ste. Genevieve	15.5	0.4
Rhyolite	?	11.0	0.3
Fern Glen	Fern Glen	7.5	0.2
Indeterminate	?	599.0	15.0
Total		3920.0	99.9

* weighed to nearest 0.5 g

Table 14. Frequency of Chert Types by Features.

Provenience	Chert Types*											
	Burlington	Mill Creek	Kaolin	Cobden/ Dongola	Blair/ St. David	Glacial Till	Kinkaid	Fern Glen	Ste. Gene.	Rhyolite	Ind.	Total
General Surface	21.5	3.5	6.0	44.0	38.5	324.0	66.5	-	-	-	79.0	583.0
Excavation Units	23.0	11.0	24.5	80.0	692.5	942.0	263.5	7.5	5.0	11.0	296.5	2356.5
Pit Features												
2	-	-	-	-	21.0	1.5	6.0	-	-	-	10.0	38.5
3	0.5	9.0	-	0.5	8.0	74.5	11.5	-	-	-	11.5	115.5
4	-	-	-	-	-	-	-	-	-	-	4.0	4.0
7	-	-	-	-	3.0	15.0	-	-	-	-	1.0	19.0
10	-	-	-	3.0	-	-	-	-	-	-	-	3.0
11	-	-	-	-	-	1.0	-	-	-	-	0.5	1.5
13	-	-	-	1.0	-	5.0	-	-	-	-	-	6.0
14	-	-	-	-	-	2.0	9.0	-	-	-	-	11.0
15	-	-	-	-	-	1.5	-	-	-	-	3.0	4.5
16	15.0	-	-	1.5	4.5	8.5	5.0	-	2.0	-	8.5	45.0
17	-	-	-	-	-	108.5	-	-	-	-	-	108.5
19	-	-	-	1.0	6.5	-	-	-	-	-	27.5	35.0
20	-	-	-	7.5	-	-	47.0	-	-	-	-	54.5
21	-	-	-	-	-	4.5	4.0	-	-	-	1.0	9.5
22	-	-	-	-	-	-	6.0	-	-	-	-	6.0
24	-	-	-	-	-	9.0	-	-	-	-	-	9.0
27	1.0	-	-	-	5.0	1.0	-	-	-	-	9.0	16.0
28	-	-	-	8.5	1.5	9.0	-	-	-	-	4.0	23.0
30	1.0	-	-	-	6.0	2.5	-	-	-	-	0.5	10.0
30,31,36	-	4.5	-	-	-	-	-	-	-	-	-	4.5
45	-	-	-	2.0	1.5	15.0	-	-	-	-	14.0	32.5
46	-	-	-	1.0	-	63.0	-	-	-	-	-	64.0
47	-	-	-	-	-	-	-	-	-	-	2.5	2.5
48	0.5	-	-	4.5	42.5	11.5	6.0	-	8.5	-	76.5	150.0
49	1.0	-	-	0.5	0.5	12.0	-	-	-	-	5.5	19.5
51	-	-	-	0.5	-	-	-	-	-	-	-	0.5
52	-	-	-	-	-	-	-	-	-	-	0.5	0.5
55	6.5	-	-	-	9.0	-	-	-	-	-	23.5	39.0
56	-	-	-	-	-	-	4.0	-	-	-	-	4.0
57	-	3.0	-	-	2.0	4.5	-	-	-	-	1.5	11.0
58	-	-	-	0.5	-	-	-	-	-	-	-	0.5

Table 14. (cont'd).

Provenience	Chert Types*											
	Burlington	Mill Creek	Kaolin	Cobden/ Dongola	Blair/ St. David	Glacial Till	Kinkaid	Fern Glen	Ste. Gene.	Rhyolite	Ind.	Total
Pit Features												
60	7.0	-	-	-	-	2.0	-	-	-	-	0.5	9.5
59,60	-	-	-	-	0.5	1.5	-	-	-	-	5.5	7.5
63	-	-	-	-	7.0	-	2.0	-	-	-	-	9.0
65	-	-	-	-	1.0	-	-	-	-	-	-	1.0
66	-	-	-	1.0	-	-	-	-	-	-	2.5	3.5
67	-	-	-	-	18.0	21.5	-	-	-	-	5.0	44.5
69	-	-	-	0.5	-	-	42.5	-	-	-	-	43.0
70	-	-	-	-	-	-	-	-	-	-	1.0	1.0
71	-	-	-	-	9.0	-	-	-	-	-	-	9.0
Post Molds												
8	-	-	-	-	-	-	-	-	-	-	4.0	4.0
20	-	-	-	-	-	-	-	-	-	-	0.5	0.5
Total	77.0	31.0	30.5	157.5	877.5	1640.5	473.0	7.5	15.5	11.0	599.0	3920.0
Percent	1.9	0.8	0.8	4.0	22.4	42.0	12.1	0.2	0.4	0.3	15.0	99.9

*Weighed to the nearest 0.5 g

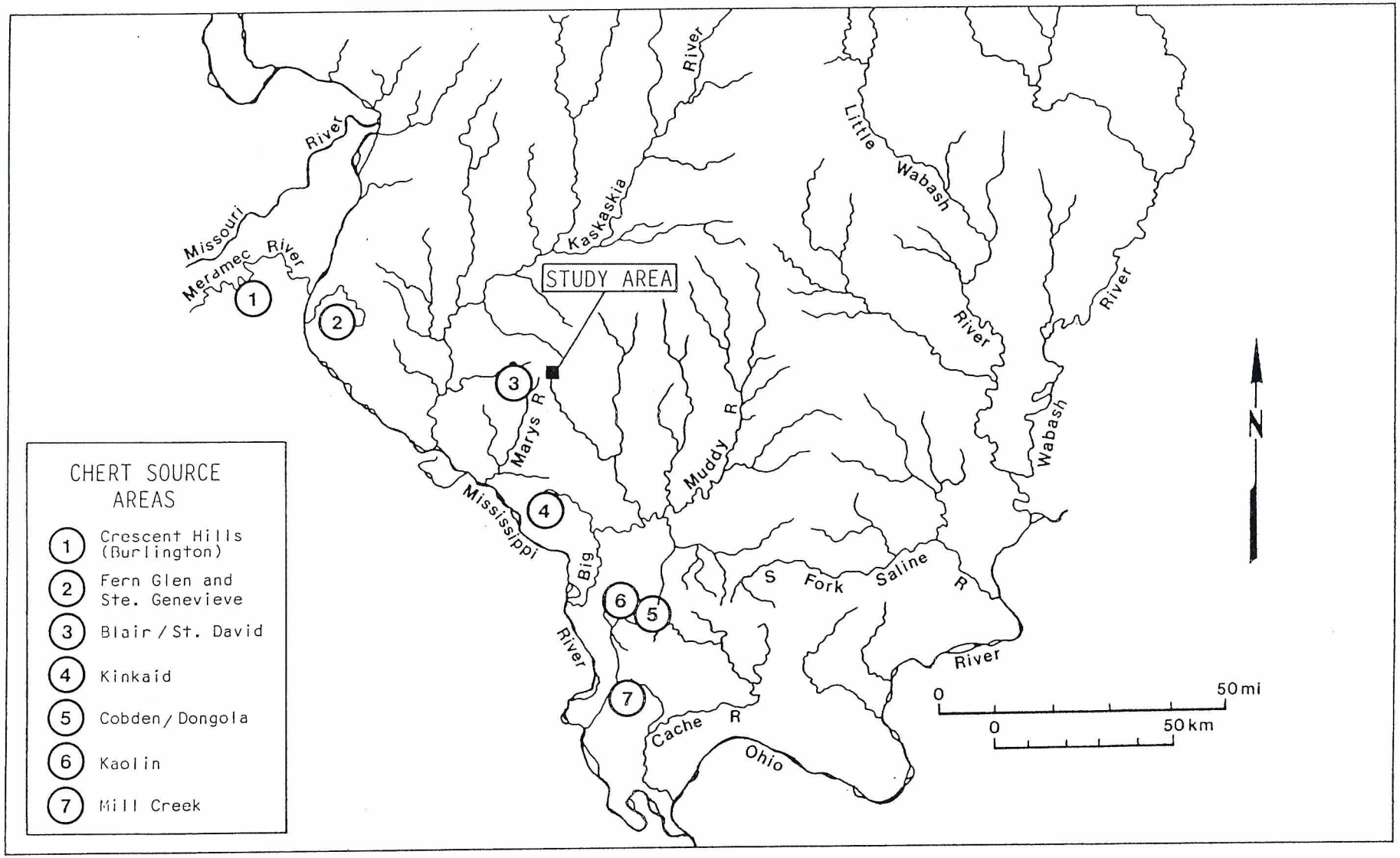


Figure 25. Chert source areas.

A large percentage of the chert cobbles that occur in the Glasford Formation exhibit macroscopic attributes nearly identical to those of Burlington chert (Koldehoff 1983). Nevertheless, glacial cherts can generally be distinguished from Burlington chert due to their lower quality (i.e., grainy texture and frequent inclusions) and differing cortex. However, artifacts manufactured from high quality glacial chert which do not possess cortex are difficult to distinguish from average fragments of Burlington. Consequently, during analysis artifacts that were too ambiguous in their attributes were relegated to the indeterminate category.

Burlington. Derived from the Burlington Limestone, this chert commonly occurs as nodules or large bedded blocks either within limestone matrices or as residuum. It ranges in quality from grainy and often highly fossiliferous to very smooth and homogeneous. Cortex is frequently thick and coarse. The coloration of Burlington chert commonly is shades of white, gray, and occasionally brown, but it should be noted that the macroscopic characteristics of Burlington varies between source areas. The largest, most heavily exploited source nearest to Galum Creek is the Crescent Hills area of east-central Missouri (Figure 25) (Ives 1975, 1984). Certain color patterns that occur in Crescent Hills chert are highly distinctive.

Blair/St. David. This chert has only recently been identified (Fraser 1982). It occurs as a discontinuous unit within the St. David Limestone, which is Pennsylvanian in age. Blair is named after a small community in eastern Randolph County situated near the type section exposed along Little Mary's River (Figure 25). It is suggested here that Blair chert be referred to as St. David chert or Blair/St. David to follow the strategy of using geologic parent formations to refer to cherts. This procedure increases the information conveyed while decreasing the number of nonformation names (which cannot be found in stratigraphy handbooks or on geologic maps) that will become ingrained in the archaeological literature (e.g., Mill Creek chert).

Blair/St. David chert occurs as bedded lenses within limestone matrices, blocky residuum at outcrops, in stream gravels near outcrops, and possibly in local glacial till deposits. Quality varies widely from massive grainy blocks nearly indistinguishable from limestone to lenses of smooth vitreous material that is often semitranslucent. Earthy shades of brown and gray are the common colors of low quality material, while high quality material exhibits brighter shades of gray as well as blue. A major drawback to the exploitation of St. David chert is that most outcrops are highly fractured. The exact distribution of St. David chert exposures is unknown.

Mill Creek. Occurring almost exclusively as long, flat nodules either in bedrock or as residuum, Mill Creek chert is generally believed to be derived from the Salem Limestone. Its texture is grainy, and generally its color is shades of brown and gray with banding and mottling common. The principle source of this chert is Mill Creek and adjacent streams in southern Union and northern Alexander counties (Figure 25). Mill Creek chert was intensively exploited by

Mississippians for the production of large bifaces, e.g. hoe, adze, and knife blades, that were widely distributed throughout the Midwest and Southeast (Winters 1981).

Cobden/Dongola. This dark colored, high quality nodular chert was exploited throughout much of prehistory in southern Illinois and is believed to be derived from the St. Louis Limestone. The best known source area of this chert is Clear Creek in Union County (Figure 25).

Kaolin. This chert type occurs entirely as residuum which appears to have been redeposited from Paleozoic bedrock. Due to its residual nature, its parent formation is unknown. Kaolin chert is highly variable in color and texture, and its prime source area is Iron Mountain along Clear Creek in Union County (Figure 25). Kaolin chert was also utilized by Mississippians to manufacture large bifaces.

Kinkaid. Kinkaid chert is derived from the Kinkaid Limestone, which has numerous exposures in southern Illinois. The common variety of Kinkaid chert is highly fossiliferous and appears as in situ lenses or as residual blocks. Its texture is generally grainy, and its color is brown, gray, or blue. The sources closest to the study area are in southwest Randolph and northwest Jackson counties.

Fern Glen. Generally smooth in texture, Fern Glen chert contains occasional fossils and ranges in color from dark green and purple to light green and gray. It is derived from the Fern Glen Limestone, which directly underlies the Burlington Formation and has exposures in western Monroe County (Figure 25) and adjacent portions of Missouri.

Ste. Genevieve. Ranging in color from light brown and red to light gray and medium blue, Ste. Genevieve chert outcrops in the Ste. Genevieve Limestone in western Monroe and Randolph counties (Figure 25). Its texture ranges from grainy and fossiliferous to smooth and lustrous in appearance. Ste. Genevieve chert has been referred to as "Root Beer" chert and was frequently utilized in the American Bottom region.

Rhyolite. Rhyolite is a fine-grained igneous rock that can be quite amenable to flint knapping. It is easily distinguished from chert by its coarse texture and crystalline inclusions of feldspar and quartz known as phenocrysts. Sources of rhyolite and other igneous raw materials, excluding glacial deposits, are rare in the Midwest. The nearest exposures of knappable rhyolite are in the St. Francois Mountains of southeast Missouri (Perttula 1984; Ray 1985). The St. Francois rhyolite sources appear to have been exploited for chipped stone tool production on a local basis; however, chipped stone tools manufactured from St. Francois rhyolite have been recovered from sites in southwestern Illinois.

Indeterminate. Artifacts that could not be identified as belonging to an established chert type were placed in this category.

Rock and Mineral Types

Rock and mineral types were segregated into six categories and were quantified by weight to the nearest 1.0 g. Brief descriptions of each category follow.

Igneous/Metamorphic (I/M). Rock types such as granite, basalt, diorite, and quartzite only occur naturally in Illinois as cobbles and pebbles in glacial till deposits. These rock types are hard and resistant and functioned well as tools for grinding, pounding, and crushing. They also functioned well as hearth stones and could be worked into a variety of formalized tools by pecking and grinding.

Sandstone. This sedimentary rock type, as well as limestone, is a common bedrock in Illinois, and much of the bedrock surface of interior southern Illinois is composed of Pennsylvanian System sandstones and limestones (Hopkins and Simon 1975). Sandstone is composed of cemented quartz grains. Its texture is coarse and ideal for grinding and abrading. Sandstone also could be used for hearth stones (i.e., heat retention).

Limestone. This sedimentary rock type is usually fine grained, loosely compacted, and easily eroded. It can be fashioned into groundstone tools but usually functions best as hearth stones.

Shale. This sedimentary rock was frequently used in conjunction with slabs of limestone or by itself in the construction of stone box graves uncovered at local Mississippian cemeteries (21C4-9) in the upper Galum Creek valley.

Limonite. This low grade, earthy form of iron ore occurs commonly in sedimentary rock formations (e.g., local sandstones) and has been found in local glacial till exposures (Fraser n.d.). Its primary use was in the production of pigments (e.g., red ocher).

Hematite. One unworked piece of hematite was recovered from the site. It was found in unit 28 and weighs 42.0 g. Southeast Missouri is one of the closest sources of hematite, and aboriginal quarrys have been identified (Holmes 1919).

The Lithic Landscape

With regard to raw material availability in the upper Galum Creek drainage, a fairly wide assortment of material outcrops along Galum Creek's channel and those of its tributaries (Figure 3). Several exposures of limestone, sandstone, and shale have been recorded. Sandstone is apparently concentrated approximately 3 km northwest of the Lightfoot site, while exposures of limestone and shale are within a kilometer to the north.

Bedrock in the Galum Creek drainage is entirely Pennsylvanian and is blanketed with a thick sequence of Pleistocene sediments and recent soils. Illinoian till is commonly exposed along the base of cutbanks in

Galum and Bonnie creeks. However, it is highly variable in content, ranging from dense concentrations of pebbles and cobbles in silty or sandy clay matrices, to massive, fine grained matrices with only occasional pebbles (see also Fraser n.d.)

During the course of research in the upper Galum drainage, limited efforts were made to locate glacial till exposures with concentrations of cobbles. One such exposure was recorded and sampled (Figure 3). It is situated at the base of a high cutbank along Bonnie Creek approximately 3 km northeast of the Lightfoot site. Igneous/metamorphic cobbles of varying size were present as well as chert cobbles, limonite concretions, and numerous chunks of local bedrock. The chert cobbles did not exceed 10 cm and were macroscopically identical to cobbles collected from known outcrops of the Glasford Formation.

In a study that examined the availability of glacial cobbles in upper Galum Creek and adjacent areas of Mary's River, Fraser (n.d.) found greater numbers of cobble-rich exposures in Mary's River. The materials available were identical to those in Galum Creek, but the increased number of sizeable cobbles was attributed by Fraser to the presence of an area of ridged drift, or Hagarstown Till, a member of the Glasford Formation. Hagarstown deposits are fairly discrete concentrations usually of gravelly till that apparently represent glacio-fluvial features such as kames and eskers (Jacobs and Lineback 1969).

The one resource absent in the Galum Creek drainage is high quality chert, particularly large pieces. Cherts in the glacial till are variable in quality and limited in size. It is possible that outcrops of Blair/St. David chert may occur somewhere in the drainage, but no outcrops or workshop sites have been located. The closest source would be some 20 km to the west in the Mary's River drainage. Consequently, chert, a raw material essential for everyday activities, had to be obtained, to some degree, outside of the drainage. The implications of this fact and the various strategies employed by each component to mitigate the problem will be examined in the next section.

In summary, a rather clear picture of the prehistoric lithic landscape of the upper Galum Creek drainage can be reconstructed by extending recent geologic data back in time. Certainly, bedrock outcrops and till exposures have been buried and eroded throughout time, yet the basic composition of these deposits and the frequency of their occurrence have probably varied little with time. Although Galum Creek and its tributaries are quite silty, scattered igneous/metamorphic and chert cobbles and chunks of local bedrock would have occurred in the stream channels on gravel bars. Large quantities of specific raw materials (i.e., sandstone, limestone, and shale) from bedrock outcrops could have been regularly procured with a high degree of predictability. In contrast, glacial till exposures with quantities of chert and igneous/metamorphic cobbles would have been less predictable, while sizeable pieces of quality chert had to be acquired from outside the drainage entirely (Figure 25).

Procurement Strategies

A total of 3,920 g of chert was recovered from the Lightfoot site (Tables 13 and 14); 599 g, or 15%, could not be assigned to specific chert types. This fairly high percentage can be partially attributed to the overlap in attributes between high quality glacial cherts and Burlington chert and the inability to type chert artifacts that have been burned. The chipped stone assemblage is dominated by three chert types, Glacial Till (42%), Blair/St. David (22.4%), and Kinkaid (12.1%). Cobden/Dongola (4.0%) and Burlington (1.9%) are the only other cherts that are represented by more than 35 g (Tables 13 and 14; Figure 26). Mill Creek, Kaolin, Ste. Genevieve, Fern Glen, and St. Francis rhyolite occur at the site in trace amounts.

Ceramic analysis (Chapter IV) has demonstrated that all but a few features at the Lightfoot site are Late Woodland, and analysis of diagnostic bifaces has identified two major components--a Middle to Late Archaic occupation dominated by Karnak points, and an early Late Woodland occupation almost exclusively represented by expanding stem points identical to Mund points which are common in the American Bottom. The Mississippian component at the site is represented by a wall trench structure, yet only one triangular arrowpoint and several hoe flakes can be assigned to this component. Combined analyses would seem to indicate that the Late Woodland occupation of the Lightfoot site was the most intensive, and it is likely that much of the chipped stone deposited at the site is related to this occupation.

A simple comparison of the chert types recovered from the Lightfoot site (Table 13) and those recovered from the Bonnie Creek site (21C4-46) (Koldehoff 1986b:Table 24), a Mississippian homestead less than 1 km to the north, clearly illustrates a temporal shift in chert procurement strategies. The Bonnie Creek site assemblage contained four principal chert types: Glacial Till (34%), Burlington (16.8%), Blair/St. David (15.7%), and Mill Creek (10%). The percentage of Burlington and Mill Creek cherts in this basically Mississippian assemblage contrasts sharply with the percentage of these cherts in the Lightfoot assemblage (Burlington, 1.9% and Mill Creek, 0.8%), which is predominantly Late Woodland and Archaic. The inhabitants of the Lightfoot site concentrated more heavily on local cherts (Glacial Till and Blair/St. David=64.4% vs. 50.8% at the Bonnie Creek site), and they procured larger amounts of Kinkaid chert (12.1% vs. 1.6% at the Bonnie Creek site).

At the Lightfoot site, Kinkaid chert was consistently recovered from Late Woodland features, and the only diagnostic bifaces manufactured from Kinkaid chert are early Late Woodland. Data from other sites in southwestern Illinois seem to support the hypothesis that Kinkaid chert was most intensely exploited during the latter part of the Middle Woodland period and initial portion of the Late Woodland period. May (1984:85) states, "Although exploited throughout prehistory, the intensity of this exploitation appears to increase through time: Kinkaid was a frequently used material in Middle and Late Wooodland

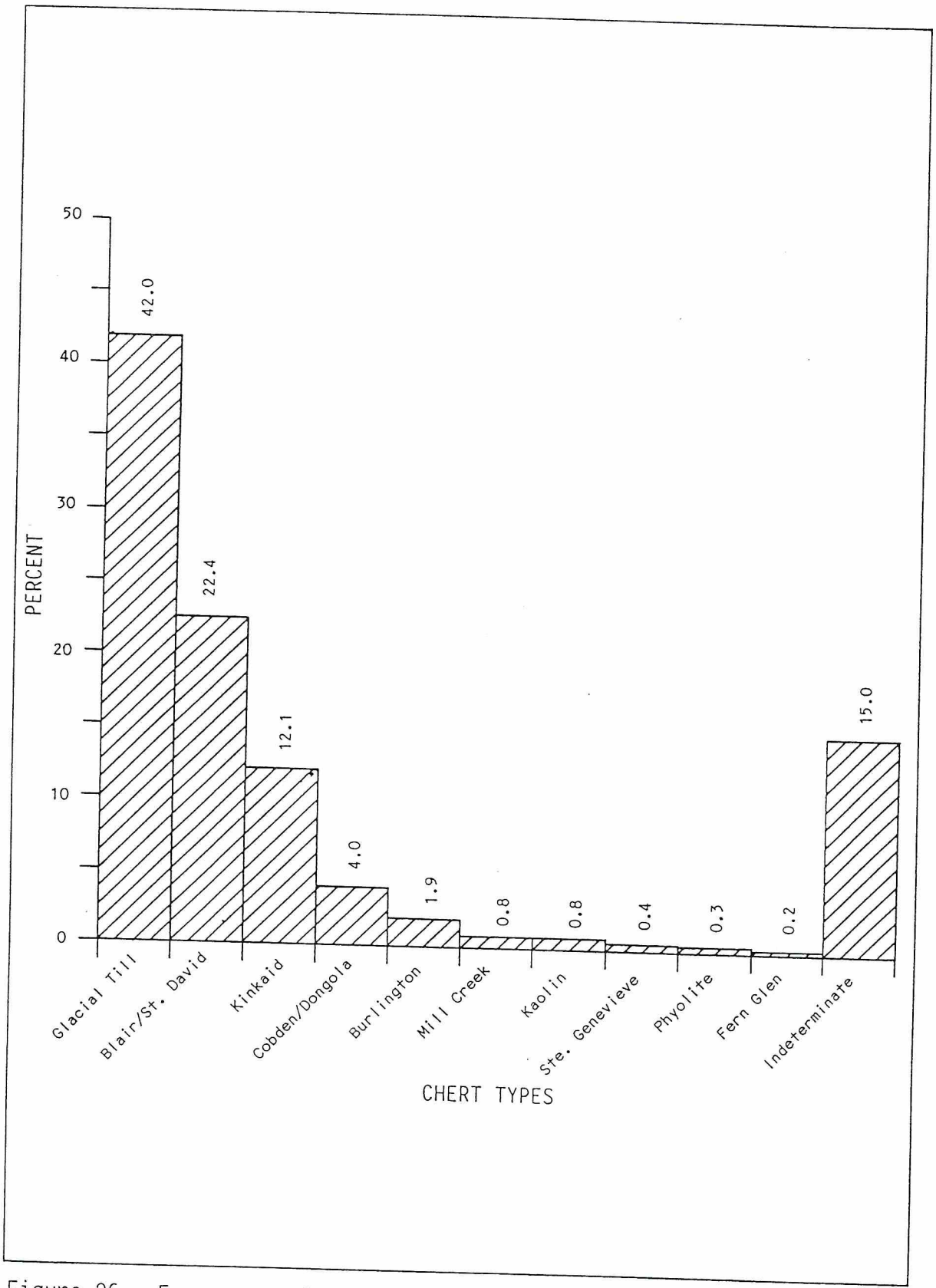


Figure 26. Frequency of chert types.

contexts." Data from features and diagnostic bifaces were employed to reconstruct patterns of lithic procurement for each component.

Archaic. The earliest component at the Lightfoot site is denoted by six fragmentary and recycled Karnak points (Figure 27a-d). Two are manufactured from Burlington chert, one from Blair/St. David chert, and the three remaining specimens have been typed as indeterminate. One of these specimens was burned, and the other two were manufactured of a distinctive raw material that closely parallels Blair/St. David chert in certain macroscopic characteristics.

At present, it cannot be determined if this material is a variety of Blair/St. David chert or a distinct chert type. Representative geologic samples collected from known Blair/St. David outcrops do not possess the distinctive physical properties of this chert. The chert frequently appears in Archaic till plain assemblages as stemmed bifaces (e.g., Karnak, Saratoga, and Cypress). Its most distinguishing characteristic is a mottled or varigated pattern of fine-grained light to medium gray chert (Munsell 5Y 7/1-6/1) and a more coarse-grained chert that is usually lighter in color, typically tan or beige (2.5Y 7/2-7/4). When a fairly large sample of artifacts manufactured from this material is assembled, the physical properties of certain specimens (or portion thereof) blend into or closely resemble color and texture ranges found in Blair/St. David chert. In addition, the material can closely resemble very pale gray-brown varieties of Cobden/Dongola chert.

The parent formation and source area of this material is unknown. Consequently, the Middle to Late Archaic Karnak component at the site contains only three bifaces which can yield source area information. This meager information indicates that the Karnak component utilized local as well as distant chert sources. The two Burlington points fall within the range of typical white and light gray colored Burlington from the Crescent Hills source area (Figure 25). It is unlikely, but not impossible, that one or both of these specimens were manufactured from Glacial chert of extremely high quality.

A large basal portion of an Etley point (Figure 27e) made from Kaolin chert was recovered from the site, and the base of a possible Etley point manufactured from rhyolite was also recovered (Figure 27j). The raw material of the latter point compares favorably to geologic samples of St. Francois rhyolite collected near Johnson's Shut-Ins State Park in Reynolds County, Missouri (ca. 130 km southeast). The point base contains white and pink colored phenocrysts in a streaked, dark gray (7.5YR 3/0) and dark reddish brown (2.5YR 4/2) matrix. The largest phenocryst measures just over 1 mm.

Four complete and fragmentary points of the Saratoga Cluster were recovered from the site (Figure 27f-g). Each specimen was made of a different raw material--Cobden/Dongola, Burlington (Crescent Hills), Glacial Till, and indeterminate. Two intact Cypress stemmed points were also recovered from the site (Figure 27h-i). Although both of these point types appear to span the Archaic and Woodland periods (May 1982), they were considered Archaic for this analysis. One Cypress point was

manufactured from Blair/St. David, while the other was manufactured from the distinctivle indeterminate chert discussed above in conjunction with Karnak points.

In totality, the 14 diagnostic bifaces examined in this section primarily fall within a Late Archaic time frame. Five were manufactured from indeterminate cherts, three from local cherts (Blair/St. David and Glacial Till), and six were manufactured from nonlocal cherts (Cobden/Dongola, Kaolin, Burlington, and St. Francois rhyolite) that outcrop from 70 km to over 100 km from Galum Creek. Given extant models of Late Archaic settlement mobility and territory size (e.g., Brown 1985; Ford 1974), it is unlikely that most of these nonlocal cherts were acquired during seasonal rounds through a large, expansive territory that encompassed a hundred or more square miles. Therefore, rather than Archaic groups procuring these cherts by means of an embedded strategy (Binford 1979), it is likely that they were acquired through some type of exchange network. Thus, contact with groups to the northwest in the American Bottom region, southwest in the St. Francois Mountains, and south in the western Shawnee Hills is indicated.

Hafted bifaces are highly portable tools that were designed for extended use and maintenance. As a result, in mobile hunter-gatherer societies, this class of artifacts has a greater potential to be manufactured from nonlocal cherts than simple expedient flake tools which were commonly manufactured from the raw materials most closely at hand and not regularly curated. A clear picture of Archaic lithic procurement strategies in the Galum Creek drainage cannot be constructed with the data from the Lightfoot site. The Archaic bifaces were probably deposited at the site by several components, and it cannot be determined what proportion of the debitage and flake tools from nonfeature context can be attributed to the various components. In general, it can be stated that the Middle to Late Archaic components at the Lightfoot site exploited local cherts for most tools except for hafted bifaces, which exhibit a higher percentage of nonlocal cherts with source areas from 70 km to over 100 km distant.

Woodland and Mississippian. The previously examined Saratoga and Cypress points may relate to the Crab Orchard occupation at the site. One Crab Orchard feature (feature 45) was identified on the basis of ceramics, and the basal portion of a Snyders point was recovered during mechanical stripping (Figure 28e). The Snyders point is manufactured of Cobden/ Dongola chert, and feature 45 produced 32.5 g of chert: 15 g Glacial Till, 2 g Cobden/Dongola, 1.5 g Blair/St. David, and 14 g indeterminate. From this small sample, it can be inferred that the Middle Woodland occupation at the Lightfoot site most heavily exploited local cherts, and Cobden/Dongola chert was procured by schedule visits to source areas in Union County or through exchange.

The Late Woodland occupation of the site was the most intensive. Eight complete and fragmentary early Late Woodland hafted bifaces and one small corner-notched arrowpoint were recovered (Figure 28a-d, f). The arrowpoint is manufactured from Cobden/Dongola chert, closely

Figure 27. Archaic Projectile Points/Knives

a. Karnak hafted scraper, indeterminate chert, mechanical stripping

b. Karnak point fragment, Blair/St. David chert, unit 27a

c. Karnak hafted scraper, Burlington chert, mechanical stripping

d. Karnak point fragment, Burlington chert, feature 60

e. Etley point fragment, Kaolin chert, unit 25

f. Saratoga point, indeterminate chert, unit 31

g. Saratoga point, Cobden/Dongola chert, unit 25

h. Cypress point, indeterminate chert, mechanical stripping

i. Cypress point, Blair/St. David chert, mechanical stripping

j. Etley (?) point fragment, rhyolite, unit 2

k. Archaic corner-notched point fragment, indeterminate chert, feature 55

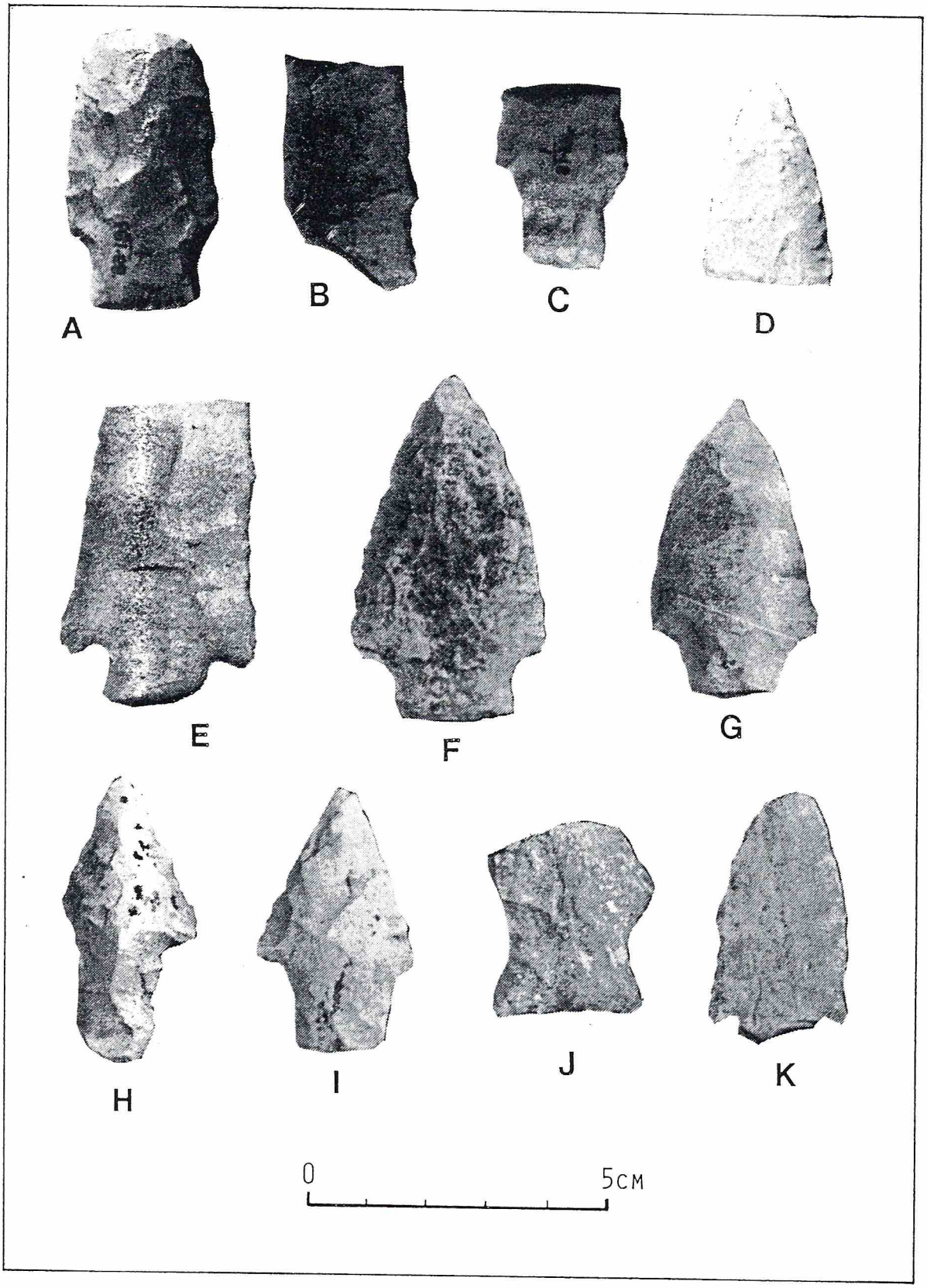


Figure 27. Archaic projectile points/knives.

Figure 28. Woodland and Mississippian Projectile Point/Knives and Assorted Tools

a. Gibson (?) point, Kinkaid chert, unit 28

b. Mund/Bend School point, Cobden/Dongola chert, feature 20

c. Mund/Bend School point, Kinkaid chert, unit 28

d. Mund/Bend School point, Kinkaid chert, unit 25

e. Snyders point, Cobden/Dongola chert, mechanical stripping

f. Koster (?) point, Cobden/Dongola chert, mechanical stripping

g. Madison point, Blair/St. David chert, mechanical stripping

h. Hafted uniface, Kinkaid chert, feature 14

i. Hafted uniface, Burlington chert, feature 55

j. Drill, Cobden/Dongola chert, mechanical stripping

k. Multipurpose flake tool, Kinkaid chert, feature 20

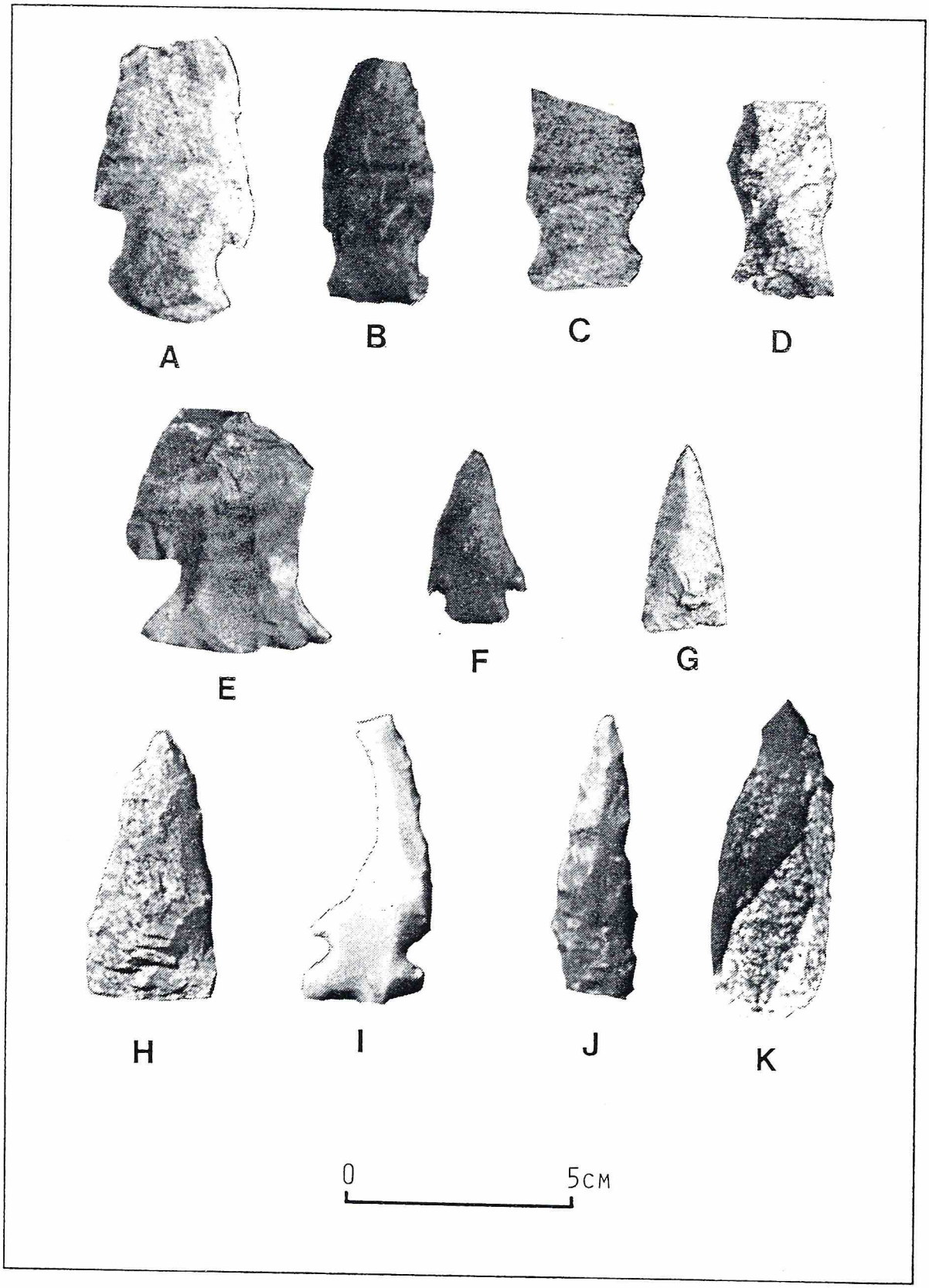


Figure 28. Woodland and Mississippian projectile points/knives and assorted tools.

resembles a Koster point, and may represent a more recent Late Woodland occupation at the site or a hunting loss.

The eight early Late Woodland hafted bifaces are manufactured from five different chert types: Kinkaid (n=4), Cobden/Dongola (n=1), Burlington (n=1), Blair/St. David (n=1), and Glacial Till (n=1). Kinkaid is clearly the chert most commonly selected for biface production, and it was the most common chert recovered from Late Woodland features. Figure 29 illustrates the percentage (by weight) of different chert types recovered from 13 features that produced five or more Late Woodland sherds (features 15, 16, 19, 20, 22, 24, 27, 28, 48, 63, 66, 67, and 69). Excluding indeterminate cherts, Kinkaid is the dominant raw material (24.5%); it is closely followed by Blair/St. David (19.2%) and Glacial Till (14%) cherts. Cobden/Dongola (5.5%), Burlington (3.7%), and Ste. Genevieve (2.4%) are the other cherts represented. By frequency of occurrence, Cobden/Dongola, Blair/St. David, and Glacial Till all occur in 7 of the 13 features, while Kinkaid is present in 6, Burlington in 3, and Ste. Genevieve in 2.

Taken as a whole, these data indicate the Late Woodland inhabitants of the Lightfoot site intensively exploited the nearest chert sources. Chert cobbles occur in local till exposures; Blair/St. David chert outcrops in the Mary's River drainage 15-20 km to the west, and exposures of Kinkaid chert occur some 30 km to the southwest near the confluence of Mary's River and the Mississippi River (Van Hoy 1980). Late Woodland populations are generally characterized as having followed a fairly sedentary lifestyle. Consequently, it is reasonable to assume Kinkaid and Blair/St. David cherts may have been procured through local exchange networks, but direct procurement cannot be disproved. However, it can be cogently argued that Cobden/Dongola, Burlington, and Ste. Genevieve cherts were obtained via exchange contacts with groups to the south in the western Shawnee Hills and to the northwest in the American Bottom region. Numerous Late Woodland habitation sites, some of which are associated with mounds and date early in the Late Woodland period, occur along the Mississippi River bluffs north and south of the mouth of the Marys River (Hutto and Butler 1981; Pauketat, personal communication 1986; Penny 1982; Van Hoy 1980). Evidence of intensive exploitation of locally occurring Kinkaid chert is found at these sites, and it is likely that Late Woodland groups in the upper Galum Creek and upper Marys River area obtained Kinkaid chert from groups that occupied this area. Blair/St. David and Glacial Till cherts have been recovered from many of these sites (Pauketat, personal communication 1986; Penny 1982); consequently, well developed social networks may have been maintained between interior Late Woodland groups and those along the Mississippi River and lower Marys River.

Patterns of localized lithic procurement have been identified for Late Woodland occupations in the Kaskaskia Valley (Lopinot et al. 1982) and in the American Bottom (Kelly et al. 1984). This trend in Late Woodland lithic procurement is paralleled by localized hunting-gathering and horticultural subsistence strategies in the above regions (Johannessen 1984; Kelly and Cross 1984; Lopinot et al. 1982) and in the lower Illinois River valley (Styles 1981).

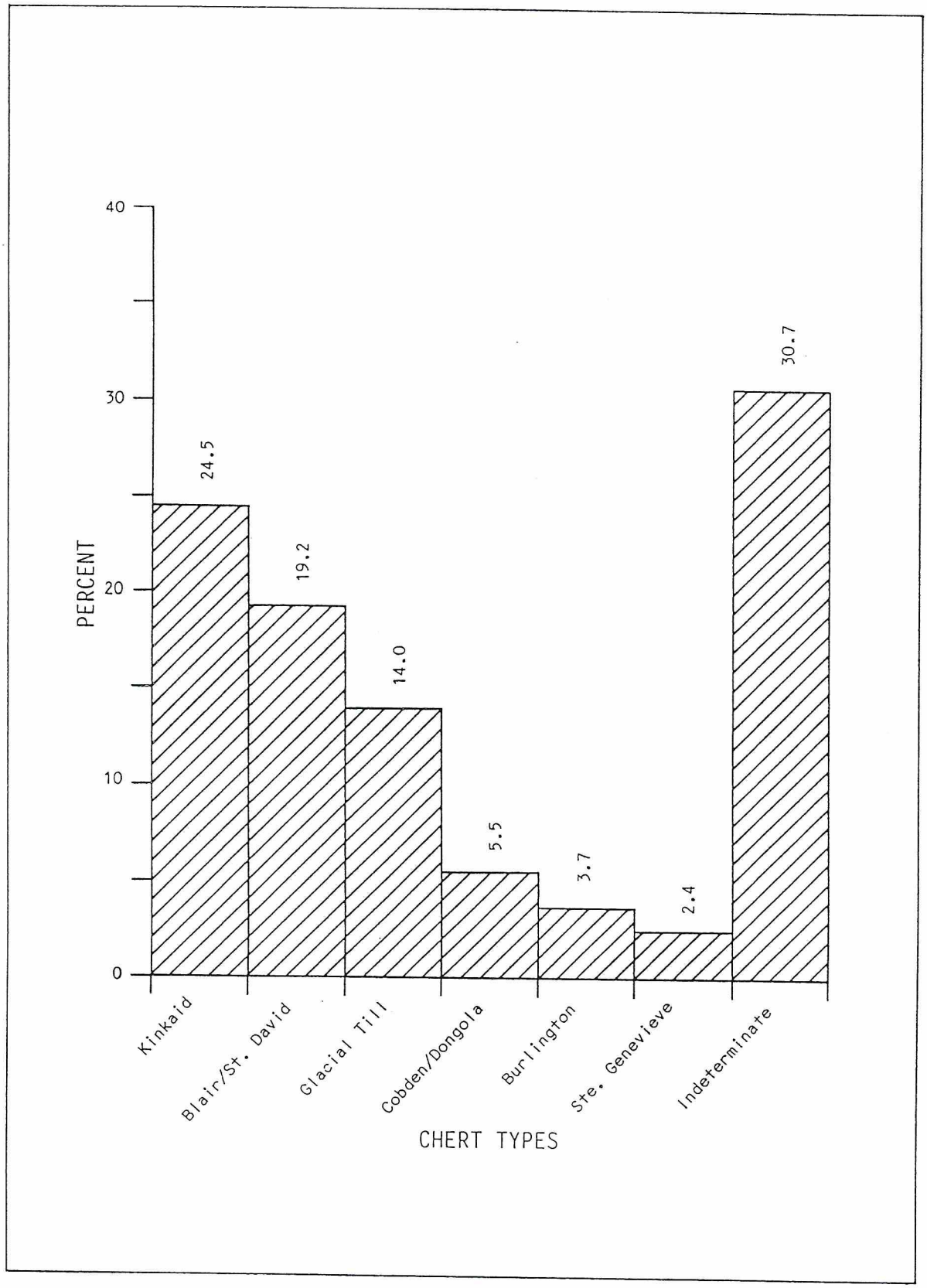


Figure 29. Frequency of chert types in Late Woodland features.

With regard to lithics, the Mississippian occupation at the Lightfoot site is represented by one triangular point (Figure 28g) and several Mill Creek chert hoe resharpening flakes (n=7). Few lithic artifacts were recovered from the intact Mississippian deposits. The triangular point is manufactured from Blair/St. David chert and was recovered during mechanical stripping. The few pieces of debitage recovered from the wall trench structure were of Burlington, Mill Creek, Blair/St. David, and Glacial Till cherts. Little can be inferred from these data regarding Mississippian lithic procurement strategies at the site, but it is valid to assume they were comparable to those documented at the Bonnie Creek site (Koldehoff 1986b). It is likely that most of the Mill Creek hoe flakes found at the site belong to the Mississippian component. This is supported by the fact that limestone hoe blades were the standard digging implement recovered from the predominantly Late Woodland Jamestown site just north of the Lightfoot site, and the use of limestone for Late Woodland hoe blades was also common in the Kaskaskia Valley (Kuttruff 1974:10; Lopinot et al. 1982:171). This pattern may represent a further adaptation of Late Woodland groups to their local environment as well as representing an indicator of more restricted social networks as compared to Mississippian societies which participated in broad regional and extraregional networks. The extensive distribution of Mill Creek chert hoe blades and other tools and raw materials (e.g., copper, marine shell, and galena) is cited as material evidence of these wide ranging contacts.

In summary, the lithic procurement strategies of the Archaic and Woodland components at the Lightfoot site are comparable in that both focused on local cherts. However, the Late Woodland occupation relied more heavily on Kinkaid chert. Mississippian lithic procurement, with reference to the Bonnie Creek site, departs from this pattern of localized procurement. Local cherts were intensively exploited, but large quantities of nonlocal cherts were also acquired. In all periods, exchange contacts outside of the till plains are indicated by various nonlocal cherts. The intensity of interaction was greatest in the Mississippian period, and the direction of interaction differs dramatically between the Late Woodland and Mississippian periods. The Late Woodland component at the Lightfoot site acquired minor amounts of chert from the American Bottom region and the western Shawnee Hills, while large quantities of Kinkaid chert were obtained from near the mouth of the Marys River. Conversely, Mississippians at the Bonnie Creek site used little or no Kinkaid chert and acquired sizeable quantities of chert from the American Bottom region and the western Shawnee Hills.

Lithic Industries

The goals of this section are to briefly describe the artifacts in the tool and debris categories and place these materials within the context of their appropriate industry. In the following section, these data will be examined with regard to site activities.

Chipped Stone Tools

Bifaces (n=54). A total of 54 bifaces was recovered from the site (Table 15; Figures 27 and 28). Seventeen were found during mechanical stripping, 25 came from excavation units, and 12 were recovered from features. The majority of bifaces found in excavation units were recovered from the plow zone. Twenty of the bifaces were made of indeterminate chert; eight were manufactured from Cobden/Dongola; Kinkaid and Blair/St. David cherts are both represented by seven bifaces; Burlington and Glacial Till cherts are both represented by five bifaces; and Kaolin and St. Francois rhyolite are both represented by one biface. Just under one half (n=25) of the bifaces could be assigned to established point types, and some of the assignments are tenuous given the fragmentary nature of many of the bifaces. Of all the bifaces recovered, only eight are complete or nearly complete, and two are intact hafted scrapers. Thirty percent (n=16) of all bifaces were thermal fractured or charred, and only six showed evidence of having been intentionally altered (i.e., heat treated). Source area analysis of the 25 classified bifaces can be found in the preceding section.

All but one of the bifaces in this category appear to be complete or fragmentary hafted bifaces in various stages of resharpening or recycling. One thin (1.6 mm) biface fragment of Kinkaid chert was retrieved from the plow zone in unit 27 and may represent a blank or preform. Fourteen of the classifiable hafted bifaces have been assigned to Archaic point types; 10 have been assigned to Woodland point types, and 1 triangular arrowpoint is considered Mississippian.

Six Karnak points (Cook 1976; May 1982; Winters 1967) represent the initial occupation of the site sometime during the late Middle Archaic or Late Archaic period. This point type was recovered from the Helton phase (3000-4000 B.C.) at the Koster site and from the Middle and Late Archaic zones at the Carrier Mills Archaeological District. Regional variation in Karnak morphology between southern Illinois, where the type was originally defined (Winters 1967), and the Lower Illinois River valley has been noted (Winters cited in Cook 1976:138). With Carrier Mills data, May (1982:1362, 1368-1369) defined two variants of Winters' (1967) original type. However, May's (1982) illustrations and descriptions would seem to indicate the variation he has documented denotes different stages of blade edge maintenance (i.e., resharpening) and functional recycling.

The typical attributes of Karnak points in southern Illinois are straight to slightly expanding stems, weak shoulders, parallel blade edges, fairly thick hexagonal blade cross sections, and bifacial blade edge resharpening. The latter is generally achieved by detaching small regularly spaced flakes from along the blade edge; this procedure usually produces a serrated edge and is very distinctive. The cross section and edge maintenance of Karnak points is so distinctive that one point midsection and two distal tips (Figure 27d) from the Lightfoot site were assigned to this point type. Three of the six Karnak points were converted into hafted scrapers, each with slightly different scraper edge morphologies. Four bifaces that were unclassified possess

Table 15. Frequency of Chipped Stone Tools.

Provenience Units	Functional Categories: Bi-Face	*Gen. Cutting	*Gen. Scraping	*Adze Flake	Spoke-shave (Notch)	Denticulate	*Graver	Drill	Chert Hammer	*Hoe Flake	Total
General Surface	17	8	10	-	-	-	-	1	-	1	37
Excavation Units	25	43	51	2	-	1	5	-	2	4	133
Pit Features											
2	-	-	1	-	-	-	-	-	-	-	1
3	-	2	7	-	1	-	-	-	-	-	10
10	-	1	-	-	-	-	-	-	-	-	1
14	1	-	-	-	-	-	-	-	-	-	1
16	1	-	3	-	-	-	1	-	-	-	5
19	-	-	1	-	-	-	-	-	-	-	1
20	1	-	1	-	-	-	-	-	-	-	2
21	-	-	1	-	-	-	-	-	-	-	1
27	-	-	1	-	-	-	-	-	-	-	1
28	1	1	-	-	-	-	-	-	-	-	2
30	-	1	-	-	-	-	-	-	-	-	1
30,31,36	-	-	-	-	-	-	-	-	-	1	1
47	1	-	-	-	-	-	-	-	-	-	1
48	2	2	2	-	-	-	-	-	-	-	6
49	1	-	-	-	-	-	-	-	-	-	1
51	-	-	-	-	-	-	1	-	-	-	1
52	1	-	-	-	-	-	-	-	-	-	1
55	2	2	3	-	-	-	-	-	-	-	7
57	-	-	-	-	-	-	-	-	-	1	1
60	1	-	-	-	-	-	-	-	-	-	1
63	-	1	1	-	-	-	-	-	-	-	2
66	-	1	-	-	-	-	-	-	-	-	1
67	-	1	-	-	-	-	-	-	-	-	1
Post Mold											
8	-	-	1	-	-	-	-	-	-	-	1
Total	54	63	83	2	1	1	7	1	2	7	221
Percent	24.4	28.5	37.6	1.0	.5	.5	3.2	.5	1.0	3.2	99.9

*These categories represent number of functions, not number of individual items

Karnak attributes but are too fragmentary for certain identification. Of the six Karnak points from the Lightfoot site, three (50%) were heat treated; this matches Cook's (1976:138) findings of 58% occurrence of heat treatment among Karnak points at Koster. It is uncertain if the Karnak points at the Lightfoot site represent a late Middle Archaic occupation coeval with the Helton phase due to the absence at the site of side-notched points (e.g., Godar and Matanzas) typical of this time period.

Two Etley point (Bell 1960; Chapman 1975; Cook 1976) bases were found at the site (Figure 27e-j), one manufactured from Kaolin chert and the other from St. Francis rhyolite. The latter point (Figure 27j), however, is only tentatively typed as an Etley, while the former point conforms well with typical Etley points found in western Illinois and eastern Missouri. These two points may represent an ephemeral Titterington phase (ca. 25,000-2000 B.C.) occupation at the site.

The Saratoga Type Cluster (May 1982; Winters 1967) is represented at the site by four bifaces--two basal fragments and two intact or nearly intact specimens. One of the latter specimens (Figure 27g) may actually be a contracting stemmed point (Dickson/Waubesa); it is difficult to assess its original haft morphology given that the extreme proximal end of the base was unintentionally snapped. The two basal fragments and the one intact specimen closely conform to Winter's (1967:Figure 4) Broad Bladed variety of the Saratoga Cluster. Saratoga points are considered Late Archaic by Winters and were recovered from the Late Archaic and lower Woodland levels at Carrier Mills (May 1982:1364).

Two complete Cypress points (Denny 1972; May 1982; Trotter and McNerney 1984) were recovered from the site (Figure 27h-l); one specimen is straight stemmed, and the other possesses a contracting stem. Contracting stemmed Cypress points were recovered from Late Archaic through Middle Woodland contexts at the Carrier Mills District with assigned dates of 3000 B.C.-A.D. 500 (May 1982:1366). At the Kingfish site, it was suggested that Cypress points extend into the Late Woodland period (Lopinot et al. 1982:82). Morphologically, straight stemmed Cypress points are comparable to Dyroff points of the recently defined terminal Late Archaic Prairie Lake phase (1000-600 B.C.) in the American Bottom (McElrath et al. 1984). May (1982:1367) assigns a time frame of 3000-500 B.C. for straight stemmed Cypress points. The temporal ubiquity of Cypress points helps to obscure the occupational intensity of the Archaic and Woodland components at the site.

The basal portion of one Snyders point (Bell 1958; Montet-White 1968) was recovered from the stripped site surface (Figure 28e). It is isomorphic with typical specimens found in Middle Woodland asssemblages in western Illinois. Snyders and Affinis Snyders points were common in the Middle Woodland at the Carrier Mills District (May 1982). This particular specimen has either suffered severe impact damage on one face (converse side of Figure 28e) or was utilized as a core for the detachment of at least two flakes. Three other indeterminate biface fragments at the Lightfoot site were also used as cores, and one

specimen was clearly a biface that had been converted into a bipolar core.

An early Late Woodland occupation at the Lightfoot site is indicated by the retrieval of seven fragmentary hafted bifaces with expanding stems or faint side notches. Six of the bifaces are comparable to Mund points (Lacampagne 1983) (Figure 28b-d). Mund points are diagnostic of the Mund phase (A.D. 450-600) in the American Bottom and primarily exhibit expanding stem haft elements. Mund points, or their antecedents, have been recovered from Rosewood phase sites in the American Bottom and adjacent uplands (Bentz 1985; Kelly et al. 1984). The Rosewood phase predates the Mund phase (A.D. 300-450), and Kelly et al. (1984:109) characterize Rosewood phase projectile points as "cognates of Steuben Expanded Stemmed (Morse 1963) or Lowe Flared Base" (Winters 1967) point types.

The remaining hafted biface (Figure 28a) is more corner notched than side notched and, to some extent, resembles a Gibson (White 1968) or Affinis Snyders (May 1982; Winters 1967). In addition to these seven points, another "hafted biface" from the site is considered to be early Late Woodland (Figure 28h). It was recovered from feature 14, is primarily worked on one face, both blade edges are well worn from knife use, the very distal end is rounded from use as a drill tip or graver point, and the proximal end has had several crude flakes detached to facilitate hafting.

It has been noted (Bentz 1985:41) that Mund points closely resemble bifaces of the Bend School type previously defined in the American Bottom by Harn (1971:33, Plate 33). If temporal and morphological equivalence between these two types can be demonstrated, the earlier type name should take precedence. Hafted bifaces very similar to Mund points or Bend School knives have been recovered from other sites along Galum Creek in both the North and South fields of Burning Star Mine #4 (Haas and McNerney 1986; Pulcher 1974a).

It should be noted that the Mund/Bend School points (Figure 28b-d) recovered from the Lightfoot site and Mund points from the American Bottom (Kelly et al. 1984:Plate 18; Lacampagne 1983:Figures 80-82) closely resemble certain varieties of Matanzas points (Cook 1976:Figures 37, 39). Researchers should be aware of this similarity when bifaces from surface collections or mixed contexts are typologically analyzed. The principal differences between Mund/Bend School and Matanzas point types are that Mund points are usually thinner in cross section, more crudely flaked, and possess less extensive basal grinding. Furthermore, straight stemmed Mund points (Lacampagne 1983:Figure 82) resemble Kramer points to some degree.

The majority of early Late Woodland hafted bifaces from the Lightfoot site (n=6) conform to one point type which is equivalent to the Mund and Bend School types in the American Bottom. However, it cannot be determined if these bifaces represent an occupation(s) coeval with the Mund and/or Rosewood phases.

Two arrowpoints were recovered from the Lightfoot site (Figure 28f-g). One specimen is corner notched and considered Late Woodland due to its similarity to Koster points defined by Perino (1971). The other point is triangular and is assigned to the Mississippian occupation. It is identical to triangular points from the Bonnie Creek site.

In summary, at least four components--Late Archaic, Middle Woodland, Late Woodland, and Mississippian--are represented by the bifaces recovered from the Lightfoot site. The Late Archaic and Late Woodland types were the most common.

Generalized Cutting Tools (n=63). A total of 53 flake tools that functioned as generalized cutting tools was recorded, and an additional 10 multipurpose tools exhibited cutting edges. Consequently, a combined total of 63 tools was used to perform cutting tasks (Table 15, Figure 30). Cutting edges were identified on core reduction flakes, biface reduction flakes, and block shatter.

Generalized Scraping Tools (n=83). Seventy four flake tools functioned as generalized scraping tools, and an additional 9 multipurpose tools exhibited scraping edges. Consequently, a combined total of 83 tools was used to perform scraping tasks (Table 15; Figure 30). Scraping edges commonly appeared on block shatter, core reduction flakes, and biface reduction flakes. All scraping tools in the assemblage excluding hafted scrapers were simply flakes used with little or no prior modification; however, one unusual hafted multipurpose tool was recovered from feature 55 (Figures 28 and 31), a flake of Burlington chert with deep side notches and both cutting and scraping edges.

Adze Flakes (n=2). Two adze resharpening flakes were recovered from unit 27. Both are fire damaged and have been typed as indeterminate chert.

Spokeshaves/Notches (n=1). One spokeshave was identified. It occurred on pieces of fire damaged Blair/St. David chert and was found in feature 3.

Denticulates (n=1). One denticulated edge was identified on a flake tool recovered from an excavation unit.

Gravers (n=7). Seven graver points were identified. Six occurred on flakes with no other functional edges while one occurred on a multipurpose tool.

Drill (n=1). One drill was recovered (Figure 28j). It is fragmentary, made of Cobden/Dongola chert, and measures 5 cm in length.

Chert Hammers (n=2). Two fragmentary specimens were recovered from excavation units.

Hoe Flakes and Fragments (n=7). Seven hoe flakes were recovered.

All were made of Mill Creek chert, and only two were recovered from features (Table 15). None were used as tools.

Chipped Stone Debitage

Freehand Cores (n=27). Freehand percussion cores are pieces of chert that have had flakes detached in multiple directions by holding the core in one hand and striking it with a hammerstone held in the other hand (Crabtree 1972). Freehand core reduction produces flake shatter, block shatter, decortication flakes, and core reduction flakes. Twenty seven freehand cores with a mean weight of 49.2 g (Tables 16 and 17; Figures 31 and 32) were identified. Blair/St. David and Glacial cherts were the most commonly used.

Bipolar Cores (n=17). Bipolar cores are pieces of chert that have been placed on an anvil and struck vertically with a hammerstone (Binford and Quimby 1963; Crabtree 1972). The objective of this flaking technique is to detach flakes from small pieces of chert; however, large quantities of shatter usually are produced as well. Flakes detached from bipolar cores often have sheared bulbs of percussion, shattered striking platforms, and crushing on one or both ends. Bipolar cores generally assume a tabular shape and possess heavy crushing and battering on both poles or ends. There has been confusion over distinguishing wedges (Pieces Esquillees) from bipolar cores (Hayden 1980). All specimens from the Lightfoot site appear to be bipolar cores.

A total of 17 bipolar cores was identified (Tables 16 and 17; Figures 31 and 32). The mean weight of bipolar cores was 6.5 g, and the dominant chert employed was Glacial Till (Table 17).

Decortication Flakes (n=48). Forty eight decortication flakes were recovered that had not been converted into tools (Tables 16 and 17; Figures 31 and 32). An assortment of cherts are represented: Glacial Till (n=21, 60%), indeterminate (n=7, 15%), Burlington (n=1, 2%), Blair/St. David (n=12, 25%), Cobden/Dongola (n=1, 2%), Kinkaid (n=5, 10%) and Ste. Genevieve (n=1, 2%) (Figure 33).

Block Shatter (n=140). A total of 140 pieces of unutilized block shatter was recovered (Table 16).

Flake Shatter (n=56). A total of 56 pieces of flake shatter was recovered (Table 16).

Core Reduction Flakes (n=103). A total of 103 flakes detached from freehand and bipolar cores that were not converted into flake tools was recovered.

Biface Reduction Flakes (n=70). A total of 70 biface thinning and resharpening flakes that were not converted into flake tools was identified (Table 16; Figure 32). These flakes undoubtedly were detached from Archaic and Woodland bifaces.

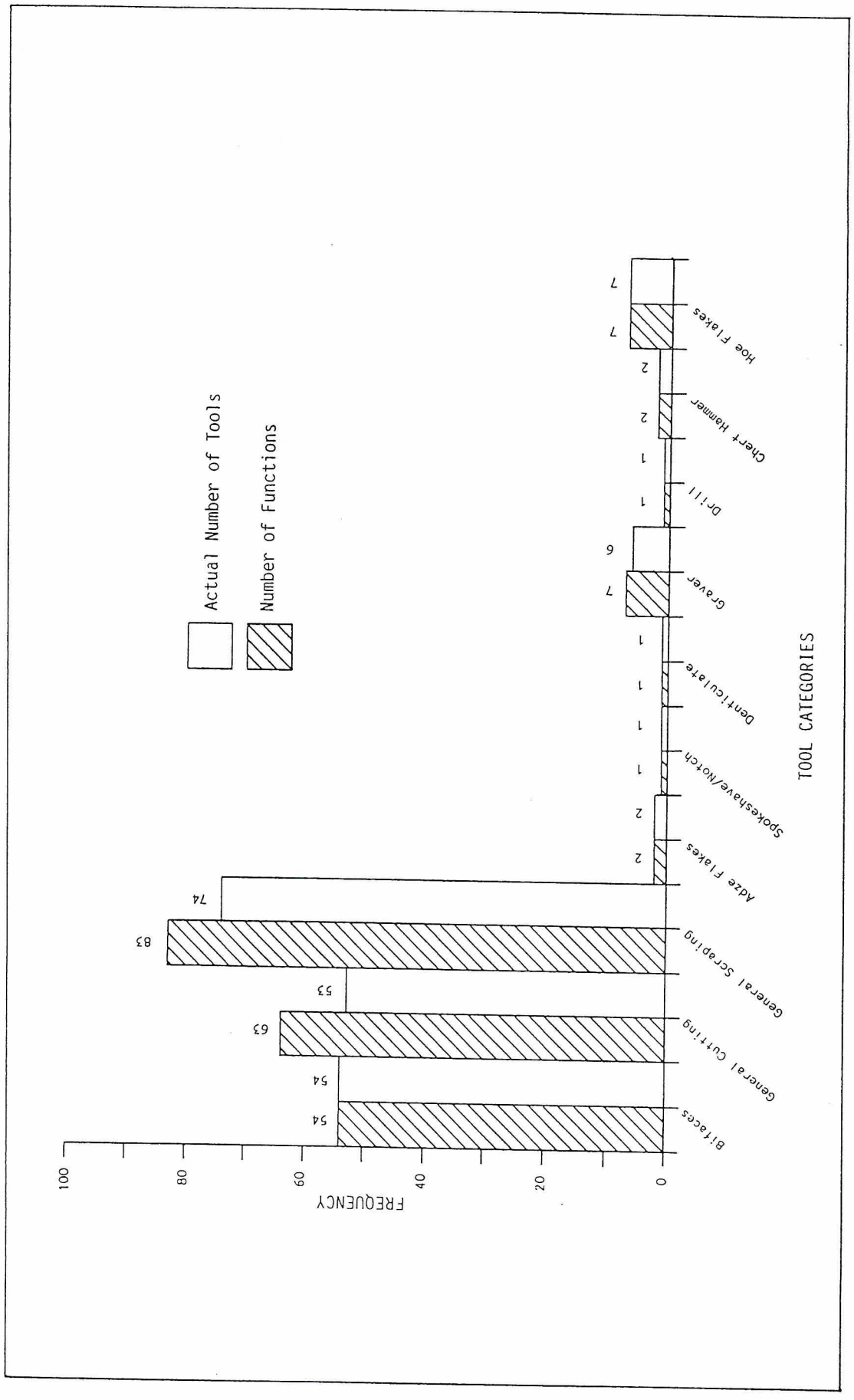


Figure 30. Frequency of chipped stone tools.

Figure 31. Cores and Hafted Uniface

a. Freehand multidirectional core, glacial chert, unit 23

b. Freehand multidirectional core, Blair/St. David chert, feature 48

c. Bipolar core, glacial chert, unit 26

d. Bipolar core, glacial chert, unit 27a

e. Hafted uniface, Burlington chert, feature 55

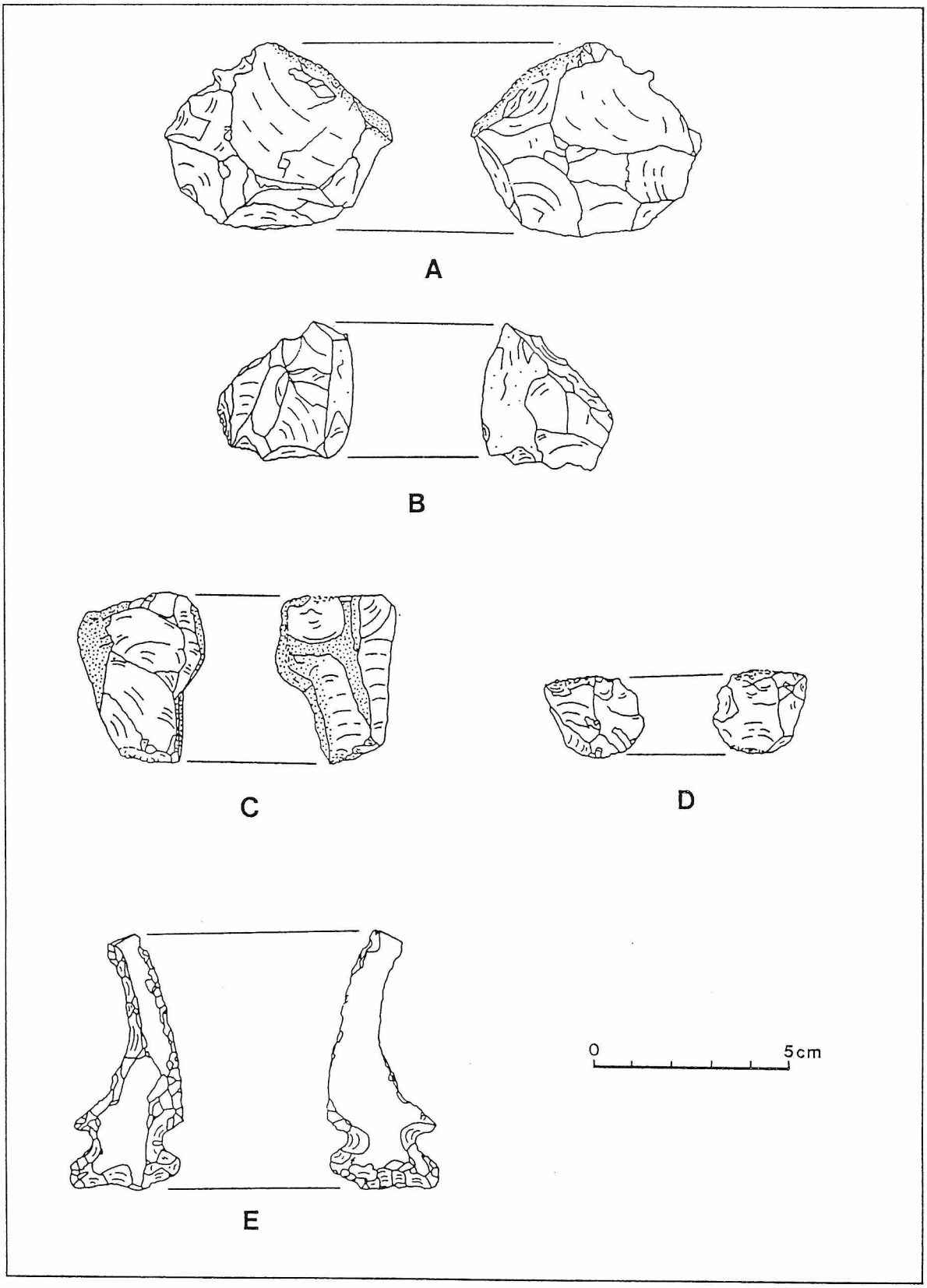


Figure 31. Cores and hafted uniface.

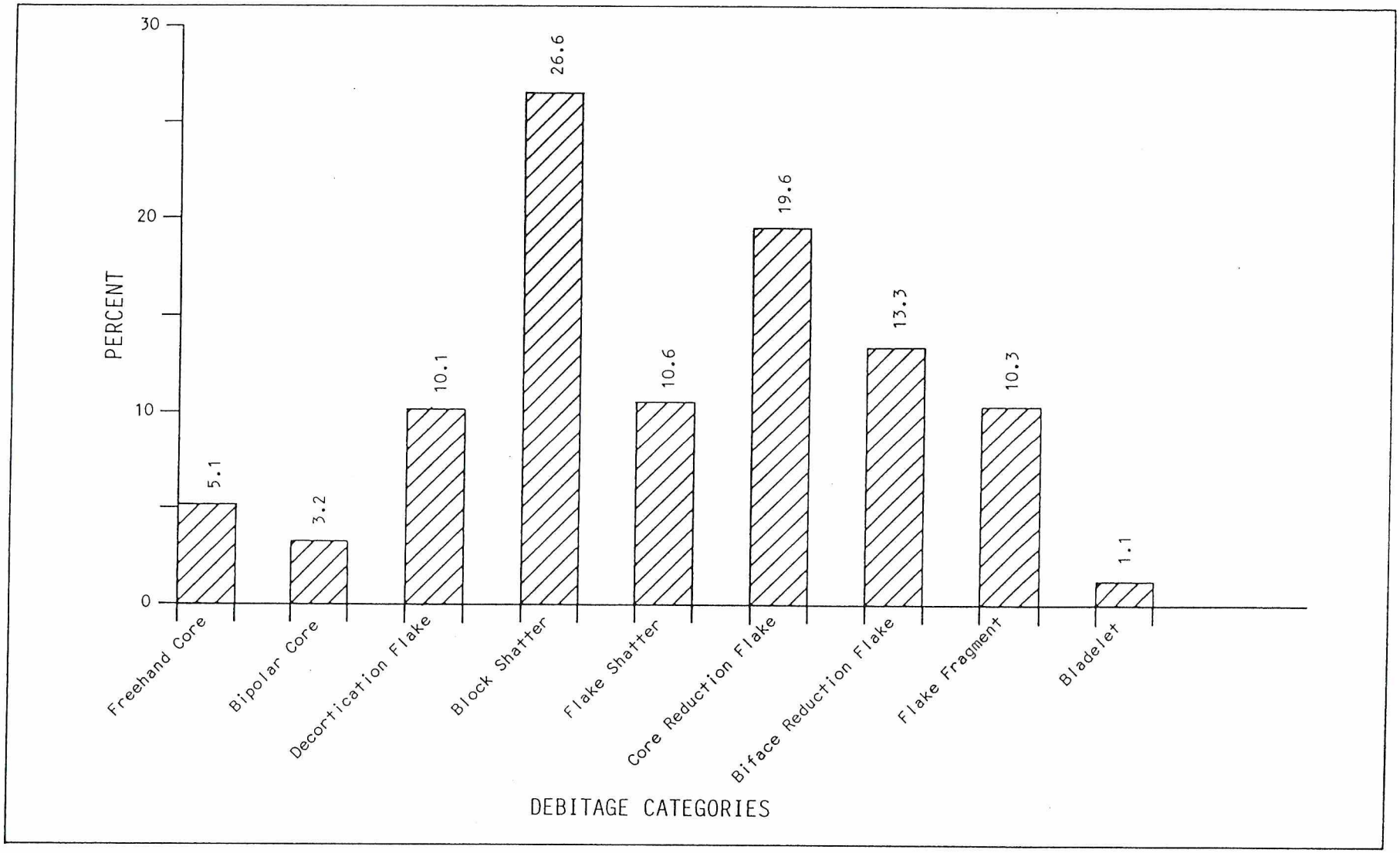


Figure 32. Frequency of debitage.

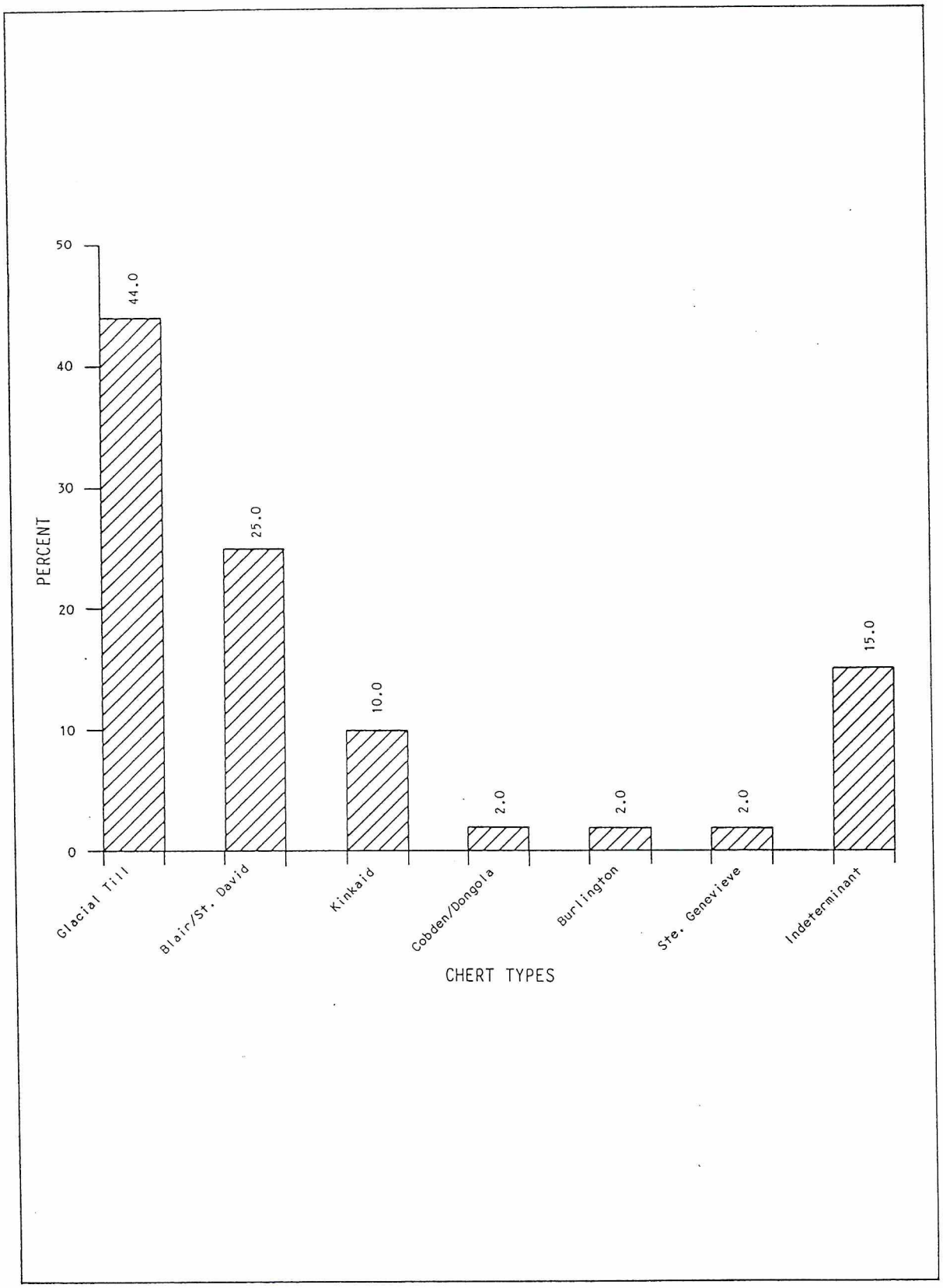


Figure 33. Frequency of decortication flakes by raw material type.

Table 16. Frequency of Chipped Stone Debitage.

Provenience Units	Freehand Core	Bipolar Core	Decortication Flake	Block Shatter	Flake Shatter	Core Reduction Flake	Biface Reduction Flake	Flake Fragment	Bladelets	Total
General Surface	3	-	4	-	1	2	2	-	-	12
Excavation Units	13	10	26	101	23	63	34	34	4	308
Pit Features										
2	-	-	1	2	1	1	-	2	-	7
3	1	1	3	7	6	4	6	3	-	31
4	-	-	-	1	1	-	-	-	-	2
7	-	1	-	3	-	-	-	1	1	6
11	-	-	1	-	2	-	-	-	-	3
13	-	-	1	-	-	-	-	1	-	2
14	-	-	-	1	-	-	-	-	-	1
15	-	-	-	2	-	-	-	-	-	2
16	1	-	2	3	2	3	3	2	1	17
17	1	-	-	-	-	-	-	-	-	1
19	-	-	2	1	-	1	-	-	-	4
20	1	-	1	-	-	2	-	2	-	6
21	-	-	1	-	1	-	5	1	-	8
22	-	-	-	-	-	1	-	-	-	1
24	-	1	1	-	-	-	-	-	-	2
27	-	-	-	2	-	1	-	-	-	3
28	-	-	-	1	-	1	-	-	-	2
30	-	1	-	1	2	-	-	-	-	4
42	-	1	-	-	-	-	-	-	-	1
45	-	-	-	3	1	2	1	-	-	7
46	1	-	1	-	-	-	-	1	-	3
48	4	-	6	6	4	13	9	6	-	48
49	-	1	-	1	1	-	2	-	-	5
55	-	-	-	-	5	2	2	-	-	9
56	-	-	-	1	-	-	1	-	-	2
57	-	-	1	-	1	3	-	1	-	6
58	-	-	-	-	1	-	-	-	-	1
60	-	-	-	1	1	-	1	-	-	3
59,60	-	-	1	1	1	-	-	-	-	3
63	-	-	-	-	-	1	-	-	-	1

Table 16. (cont'd).

Provenience Units	Freehand Core	Bipolar Core	Decortication Flake	Block Shatter	Flake Shatter	Core Reduction Flake	Biface Reduction Flake	Flake Fragment	Bladelets	Total
Pit Features										
65	-	-	-	-	-	-	1	-	-	1
66	-	-	-	1	1	-	-	-	-	2
67	-	1	1	1	-	2	1	-	-	6
69	1	-	-	-	-	-	1	-	-	2
70	-	-	-	-	-	1	1	-	-	2
71	1	-	-	-	-	-	-	-	-	1
Post Mold										
20	-	-	-	-	1	-	-	-	-	1
Total	27	17	53	140	56	103	70	54	6	526
Percent	5.1	3.2	10.1	26.6	10.6	19.6	13.3	10.3	1.1	99.9

Table 17. Core Types.

Chert Types	Core Types*				
	Freehand Cores				
	No.	Wt.(g)	Mean Wt.(g)	% No.	% Wt.
Glacial Till	12	723.5	60.3	44.4	54.4
Blair/St. David	6	394.5	65.8	22.2	29.7
Kinkaid	3	82.5	27.5	11.1	6.2
Burlington	1	15.0	15.0	3.7	1.1
Indeterminate	5	113.5	22.7	18.5	8.5
Total	27	1329.0	49.2	99.9	99.9
	Bipolar Cores				
Glacial Till	10	72.0	7.2	58.8	65.4
Blair/St. David	1	5.5	5.5	5.9	5.0
Burlington	1	4.5	4.5	5.9	4.1
Cobden	1	7.0	7.0	5.9	6.4
Indeterminate	4	21.0	5.3	23.5	19.1
Total	17	110.0	6.5	100.0	100.0

* Weighed to the nearest 0.5 g

Flake Fragments (n=54). A total of 54 flake fragments that were not utilized and could not be placed in one of the above flake categories was identified.

Bladelets (n=6). Only six blade-like flakes were identified. This indicates that formalized blade production and use did not take place at the site and was not a technology common to any of the components at the site.

Groundstone Tools and Cracked Rock

A total of 59,365 g of groundstone and cracked rock was recovered from the Ligftfoot site (Tables 18 and 19). The 61 groundstone tools

had a combined weight of 22,344 g, while the 1,927 pieces of cracked rock weighed 37,021 g. The latter is divided into four rock types: limestone, sandstone, igneous/metamorphic, and limonite (Table 19). By frequency (42.8%) and weight (59.2%), igneous/metamorphic is the most common. Much of the limonite category is not actually composed of limonite but small fragments of ferruginous sandstone. Cracked rock is interpreted as residue from food processing and preparation.

Mano/Grinding Stones (n=80). A total of 80 grinding surfaces was recorded on igneous/metamorphic cobbles. Most were found in excavation units and during mechanical stripping (Table 18).

Metate/Grinding Slabs (n=10). Ten large grinding surfaces or fragments thereof were identified. These all occurred on large igneous/metamorphic cobbles. Metates were not recovered from features.

Hammers (n=38). Evidence of hammering activities existed on 38 igneous/metamorphic cobbles.

Anvils (n=7). Seven shallow anvil depressions were identified on igneous/metamorphic cobbles.

Celts/Axes (n=5). Five fragmentary axes or celts were recovered. Four were found in features (Table 18). Most of the fragments appear to be from celts.

Pitted Stone (n=3). A total of only three pits occurred on all the cobble tools.

Slotted Abraders (n=5). A total of 5 abrader slots occurred on two fragments of sandstone. One abrader was found in feature 72 and the other in excavation unit 28.

Flat Abraders (n=6). Six flat to slightly concave abrading surfaces occurred on three tabular pieces of sandstone. All were recovered from excavation unit 29 (Table 18).

Biface Industries

Three separate biface industries were identified from the tools and debris retrieved from the Lightfoot site. Each industry manufactured highly formalized tools. The first industry dates to the Mississippian occupation and is represented by only seven resharpening flakes detached from hoe blades. This large-biface industry was well represented at the Bonnie Creek site, where numerous large bifaces were regularly maintained and frequently recycled (Koldehoff 1986b). Initial production of large bifaces in the Mississippian period was centered at the Mill Creek, Kaolin, and Crescent Hill Quarries. These seven resharpening flakes indicate that at least one or two hoe blades of Mill Creek chert were acquired, used, and maintained by the Mississippian household that occupied the Lightfoot site. It is possible that some of these hoe flakes could belong to earlier components at the site, i.e., Middle or Late Woodland.

Table 18. Frequency of Groundstone Tools.

Provenience Units	Functional Categories									
	Mano	Metate	Hammer	Anvil	*Celt/ Ax	Pitted Stone	Slotted Abrader	Flat Abrader	*Plummet Preform	Total
General Surface	36	6	19	1	-	1	-	-	1	65
Excavation Units	26	4	11	2	3	-	3	6	-	55
Pit Features										
13	2	-	1	1	-	-	-	-	-	4
20	2	-	2	-	1	-	-	-	-	5
22	4	-	1	1	-	-	-	-	-	6
25	-	-	-	-	-	-	-	-	1	1
27	-	-	2	1	-	-	-	-	-	3
45	5	-	2	1	-	2	-	-	-	10
55	2	-	-	-	-	-	-	-	-	2
59/60	2	-	-	-	-	-	-	-	-	2
72	-	-	-	-	-	-	2	-	-	2
Post Mold										
20	-	-	-	-	1	-	-	-	-	1
Total	80	10	38	7	5	3	5	6	2	156
Percent	51.3	6.4	24.4	4.5	3.2	1.9	3.2	3.8	1.3	100

*All functional categories, excluding celt/ax and plummet preform, are quantified by number of functional surfaces, not individual items.

Table 19. Frequency of Cracked Rock.

Provenience Unit	Types of Raw Material*									
	Sandstone		Limestone		I/M		Limonite		Total	
	No.	Wt(g)	No.	Wt(g)	No.	Wt(g)	No.	Wt(g)	No.	Wt(g)
Excavation Units	369	5121	66	1025	658	15425	84	499	1117	22070
Pit Features										
2	3	22	-	-	18	410	1	2	22	434
3	10	229	-	-	8	478	28	69	46	776
4	2	87	-	-	-	-	3	9	5	96
7	-	-	6	19	2	20	-	-	8	39
9	-	-	-	-	1	60	-	-	1	60
10	-	-	63	1073	-	-	-	-	63	1073
11	4	24	-	-	5	163	-	-	9	187
13	-	-	28	382	3	28	-	-	31	410
14	1	2	12	226	-	-	-	-	13	228
15	-	-	1	3	-	-	-	-	1	3
16	2	195	5	30	11	1330	1	1	19	1556
17	1	9	4	29	-	-	-	-	5	38
18	-	-	1	6	2	43	-	-	3	49
19	2	27	-	-	3	19	1	5	6	51
20	13	326	65	847	7	208	-	-	85	1381
21	1	3	-	-	-	-	3	3	4	6
22	-	-	1	3	-	-	-	-	1	3
24	1	4	28	296	-	-	-	-	29	300
25	4	97	13	55	-	-	-	-	17	152
26	1	4	-	-	-	-	-	-	1	4
27	-	-	2	3	-	-	-	-	2	3
28	-	-	2	10	2	12	-	-	4	22
29	1	4	1	688	-	-	1	2	3	694
30	-	-	-	-	1	31	-	-	1	31
30,31,36	-	-	-	-	-	-	1	2	1	2
36	-	-	-	-	1	1000	1	6	2	1006
38	2	80	-	-	1	19	-	-	3	99
39	-	-	5	57	1	4	-	-	6	61
40	-	-	1	11	10	121	-	-	11	132
42	-	-	2	1	3	19	-	-	5	20
45	-	-	1	126	5	512	-	-	6	638
46	-	-	1	2	2	53	-	-	3	55
47	-	-	3	20	3	22	-	-	6	42
49	1	211	-	-	4	168	1	3	6	382
50	4	56	13	52	1	155	-	-	18	263
51	-	-	-	-	4	190	-	-	4	190
52	1	6	-	-	-	-	-	-	1	6
53	2	7	-	-	-	-	-	-	2	7
54	-	-	-	-	-	-	4	16	4	16
55	5	36	12	29	41	710	19	142	77	917
56	1	26	9	101	-	-	-	-	10	127
57	2	45	10	48	1	88	-	-	13	181

Table 19. (cont'd).

Provenience Unit	Types of Raw Material*									
	Sandstone		Limestone		I/M		Limonite		Total	
	No.	Wt(g)	No.	Wt(g)	No.	Wt(g)	No.	Wt(g)	No.	Wt(g)
Pit Features										
58	-	-	-	-	2	5	-	-	2	5
59,60	2	36	-	-	10	308	1	2	13	346
61	2	38	106	1682	2	86	-	-	110	1806
63	3	23	21	574	-	-	-	-	24	597
66	2	15	-	-	-	-	-	-	2	15
69	7	40	-	-	5	140	-	-	12	180
71	-	-	-	-	1	4	-	-	1	4
73	-	-	-	-	1	8	-	-	1	8
Post Molds										
17	1	19	-	-	-	-	-	-	1	19
21	13	56	9	115	5	60	-	-	27	231
Total	463	6848	491	7513	824	21899	149	761	1927	37021
Percent No.	24.0		25.5		42.8		7.7		100	
Percent Wt.		18.5		20.3		59.2		2.0		100

* weighed to the nearest 1.0 g

The second biface industry focused on the production and maintenance of medium-sized bifaces that were usually fitted into hafts and could be employed in a variety of tasks; however, these highly formalized tools regularly functioned as knives and projectiles. All but two of the 54 bifaces from the Lightfoot site fall within this industry, and the basic production procedures employed varied little from the Archaic through the Woodland period. These 4 to 10 cm long bifaces were normally produced by either reducing a cobble or core into one biface or by striking flake blanks from a core and reducing these blanks into bifaces. Direct hard and soft percussion and pressure flaking are viewed (Callahan 1979; Crabtree 1972; Holmes 1919) as the methods most commonly employed by aborigines in biface production. Through time, differing maintenance and recycling strategies were implemented; for example, the Karnak points from the Lightfoot site, like other Middle to Late Archaic hafted bifaces (Cook 1976; Morrow 1982), were frequently recycled into hafted scrapers.

The third biface industry is easily distinguished from the above industries on the basis of technology and artifact size. Its presence at the Lightfoot site is denoted by two arrowpoints (Figure 28f-g). Small hafted bifaces (i.e., less than 4 cm in length) are generally considered to have functioned as points on arrow shafts. The common method of arrowpoint production is a rather simple procedure. Flakes detached from cores or larger bifaces were shaped and thinned primarily

by direct pressure flaking with an antler or bone tool. Frequently, thin flakes were transformed into arrowpoints by merely pressure flaking the edges of the flake into a symmetrical shape. This simple technology is probably the same as that used to shape and resharpen flake tools. In the American Bottom, this arrowpoint industry began during the Patrick phase (A.D. 600-800) (Kelly et al. 1984).

Analysis of bifaces and debitage indicates that (1) Mississippian hoe blades were resharpened but not manufactured at the Lightfoot site; (2) production of Archaic and Woodland medium-sized bifaces was very limited; (3) however, medium-sized bifaces were frequently resharpened, recycled, and discarded at the site; and (4) arrowpoint production and use by the inhabitants of the Lightfoot site was minimal. In addition, the predominance of certain debitage categories (core reduction flakes, block and flake shatter, and freehand and bipolar cores) and the paucity of failed early to middle stage bifaces can be cited as evidences for an extensive flake tool industry at the Lightfoot site.

Core reduction flakes, decortication flakes, and shatter can be generated during flake tool production or during early to middle stage biface reduction. However, only one biface (of Kinkaid chert) was classified as a preform. Consequently, it is argued that biface production at the Lightfoot site was minimal. Glacial cobbles were the closest source of chert. On the average, these cobbles tend to be of poor quality and too small to produce bifaces greater than 4 cm in length. In general, the till plain of interior southern Illinois is a lithic-poor landscape. As a result, Archaic and Woodland hafted bifaces were regularly resharpened, recycled, and discarded across this landscape but were rarely produced except in the vicinity of sizeable and predictable chert outcrops, e.g., Blair/St. David source areas. It should be noted that medium-sized bifaces could have been manufactured at the Lightfoot site from bifacial blanks such as Cobden disks. In fact, two large biface reduction flakes of Cobden/Dongola chert were recovered from the Lightfoot site. The low frequency of decortication flakes of nonlocal cherts indicates intact nodules and blocks of these cherts were not imported (Figure 33).

Flake Tool Industry

A total of 192 chipped stone tools was recovered from the Lightfoot site. Fifty five bifaces (including one drill) represent 29% of the chipped stone assemblage, while simple flake knives and scrapers comprise 66% of the assemblage. These flake tools were manufactured primarily from Glacial Till and Blair/St. David cherts. Glacial cobbles and apparently unmodified blocks of Blair/St. David chert were reduced into flakes by direct freehand percussion and bipolar percussion.

The frequency of core types in Table 17 (freehand, n=27; bipolar, n=17) prompts the conclusion that freehand percussion was the most common method of flake production. In concert, these cores, flake tools, and debitage document an expedient flake tool industry at the Lightfoot site that is comparable to the flake tool industry defined at the Mississippian period Bonnie Creek site. Comparable industries also

occur in the American Bottom. It is reasonable to conclude that all components at the Lightfoot site produced, used, and discarded expedient flakes at the site. Nevertheless, simple flake scrapers and knives and core reduction flakes are common in Late Woodland features (Figures 34 and 35). Thus, it is hypothesized that expedient flake tools were regularly produced and used by the Late Woodland inhabitants of the site as with the Mississippian component.

Freehand and bipolar percussion were two techniques that were employed in a complementary fashion. Freehand percussion was used until cores became too small to be hand held comfortably, at which point the cores were placed on anvils and further reduced by bipolar reduction. Also, small (less than 5 cm in size) glacial cobbles tended to be directly placed on the anvil for reduction (e.g., Figure 31c).

Groundstone Tool Industry

Sixty one individual groundstone tools were recovered from the Lightfoot site. All but seven of these specimens were expedient tools, i.e., glacial cobbles or pieces of local sedimentary rock that were employed in crushing, grinding, hammering, and abrading tasks with little to no prior modification. The formalized groundstone tools consist of two teardrop shaped items tentatively classed as unfinished plummets and five fragments of celts or grooved axes. Four of the latter specimens are midsection or bit fragments; consequently, it cannot be determined if these fragments are parts of Archaic grooved axes or Woodland and Mississippian celts. However, two of the fragments were derived from very large tools. The fifth specimen is the butt end of a well polished triangular shaped celt. It was recovered from a Late Woodland feature (feature 20) which also produced a Mund point. With regard to provenience, two of the indeterminate specimens were found in unit 28, one in unit 27, and one in post mold 20.

These tool fragments document the existence of heavy woodworking tools at the site. These formal tools were manufactured by picking and grinding and represent a considerable investment in time versus expedient cobble tools. This factor may account for the absence of intact axes and celts at the Lightfoot site.

Site Activities and Regional Context

This final section summarizes site activities, makes regional comparisons, and provides concluding statements.

The most common tools recovered from the Lightfoot site included flake knives and scrapers (n=127), hafted bifaces (n=54) (Table 15), and expedient groundstone tools (n=54) (Table 18). Other tool types are present in small quantities. Debitage analysis indicates flake tool production and biface maintenance were common activities. Considering the number of components represented, the amount of tools and debris recovered, and the dominance of only a few tool and debris categories,

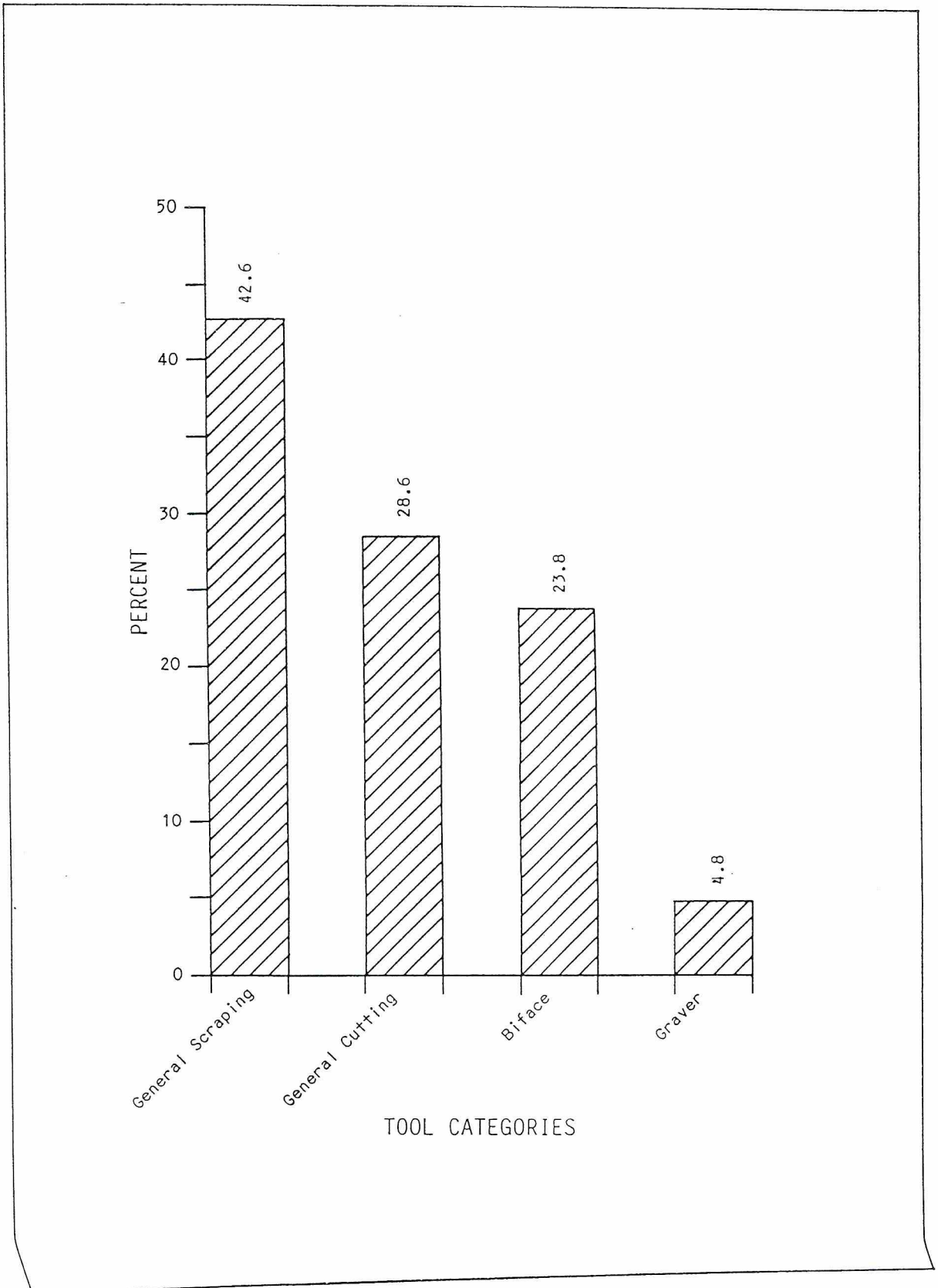


Figure 34. Frequency of tools in Late Woodland features.

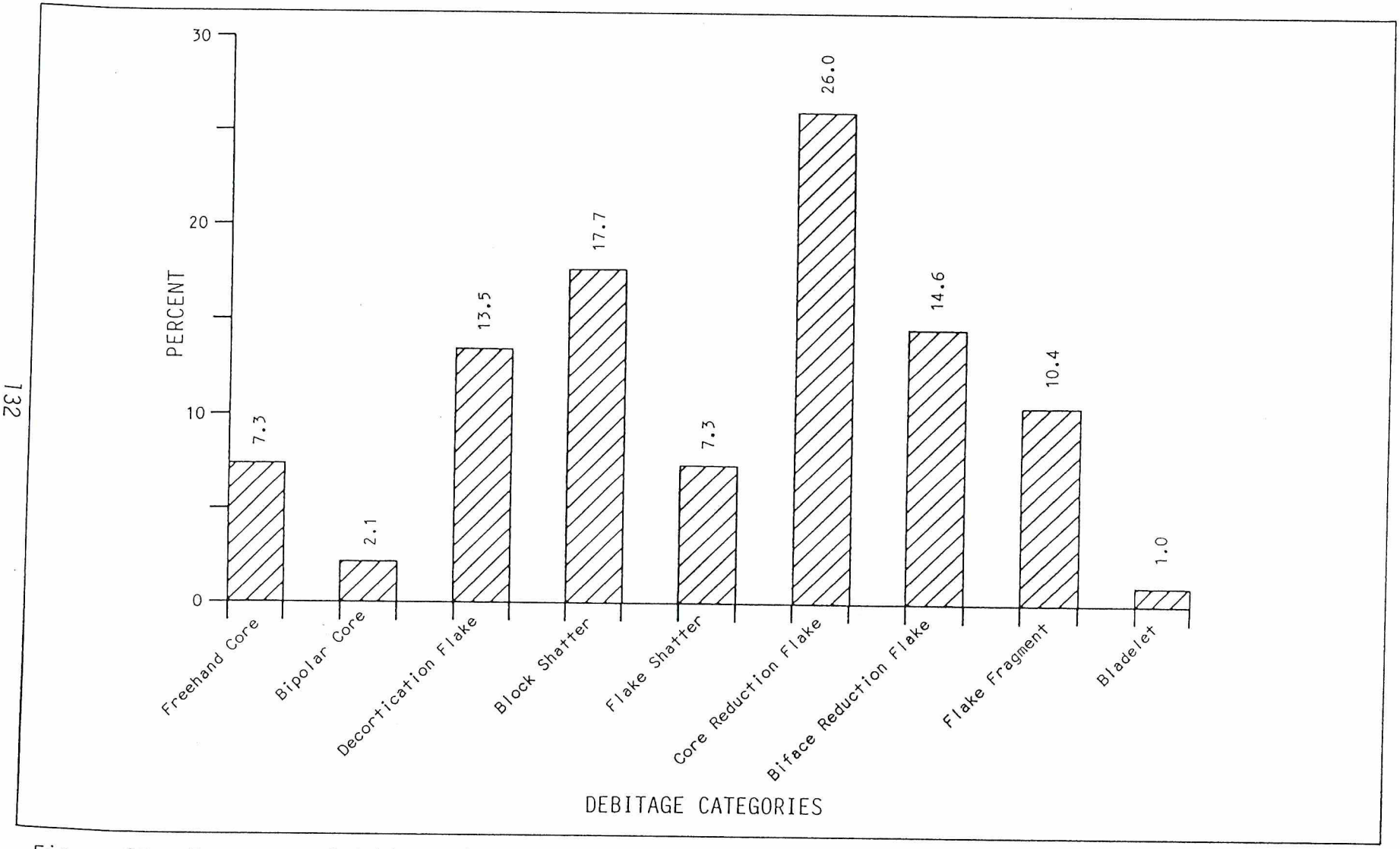


Figure 35. Frequency of debitage in Late Woodland features.

it is valid to argue that the majority of components represent short-term occupations with only a limited number of activities conducted at the site.

However, the Late Woodland and Mississippian components represent occupations of a more substantial nature compared to the earlier Middle Woodland and Archaic components. These earlier components apparently utilized the site on a short-term seasonal basis. Hunting, collecting, and initial processing of subsistence items, as well as tool maintenace, were undoubtedly the principal tasks carried out at the site and in its general vicinity. The Late Woodland and Mississippian components both possess what appear to be domestic structures. However, the Late Woodland component has been assigned a large number of pit features. With regard to number of features and diagnostic artifacts, the Late Woodland occupation was the most intensive. However, the severely eroded nature of the site and the adverse impact of erosion on shallow features cannot be underestimated in the assessment of each component. The differential preservation of organic, ceramic, and lithic artifacts is another problem in reconstructing site activities.

In contrast to the Bonnie Creek and Jamestown sites, the Late Woodland and Mississippian occupations at the Lightfoot site appear to be short lived. These two components can be interpreted as single family habitation sites where basic household production and maintenance activities were conducted. The Late Woodland component may have been involved in a broad range of activities, but general cutting and scraping tasks are the best represented (Figure 34) as well as flake tool production and hafted biface maintenance (Figure 35).

Source area analysis of chert has demonstrated that both the Archaic and Late Woodland components intensively exploited local sources. The Late Woodland occupants, however, acquired a sizeable portion (24%) of their chert from some 30 km to the southwest near the Mississippi River bluff line. Minor quantities of chert from the western Shawnee Hills and American Bottom region were also obtained. When contrasted with the chert type frequencies from the Mississippian component at the Bonnie Creek site, a clear diachronic shift in lithic procurement strategies and regional interaction is evident.

The Archaic point types recovered from the Lightfoot site tend to have a more southerly range than types commonly found in the American Bottom and lower Illinois River valley. For example, only one definite Etley point was recovered from the site, and only on occasion have Etley points been found further south in Illinois (e.g., Cook 1976; May 1982:1374). The Late Woodland hafted bifaces are very comparable to points recovered from Mund and Rosewood phase sites in the American Bottom. The Mississippian component at the Lightfoot site is poorly represented by material remains; even so, it is likely that its tool assemblage was comparable to that of the Bonnie Creek site. Consequently, both the Late Woodland and Mississippian components at the Lightfoot site would have shared close stylistic and technological ties with the American Bottom region. Yet, the fact remains that these time periods remain poorly defined in areas to the south and west of the

study area. Therefore, this initial diagnosis of close cultural affinity with the American Bottom may be premature.

The highly fragmentary and mixed nature of the lithic remains from the Lightfoot site has imposed limits on the interpretations that can be made. Nevertheless, meaningful patterns of lithic technology, site function, and resource procurement have been delineated and placed within a regional framework. In this regard, the Late Woodland component was the most productive. Further assessment of the Late Woodland occupation of the upper Galum Creek valley is forthcoming in the final report on the Jamestown site.

CHAPTER VI. SUBSISTENCE ANALYSES

Jonathan A. Bloom and Candace J. Lutzow

Subsistence related material from the Lightfoot site consisted of a relatively small assemblage of faunal, nut, and seed remains. In the following sections, the faunal analysis is presented first, followed by the ethnobotanical analysis. The implications of these analyses in regard to Late Woodland subsistence activities at the Lightfoot site, and in the upper Galum Creek valley as a whole, are examined in the concluding chapter of this report.

Faunal Analysis (Jonathan A. Bloom)

Introduction

During the 1983 and 1984 field seasons, 382 pieces of faunal material were recovered from the Lightfoot site by American Resources Group, Ltd. Three temporally distinct occupations were determined from the artifact content of relatively homogenous midden deposits and a number of pit features and wall trenches. Faunal remains were recovered from five proveniences: 1) Crab Orchard pit features (n=1), 2) Late Woodland pit features (n=20) and post molds (n=2); 3) pit features of indeterminate cultural affiliation (n=2); 4) test unit excavation levels with mixed Mississippian and Late Woodland artifacts (n=2); and 5) test unit excavation levels with mixed Late and Middle Woodland (Crab Orchard) artifacts (n=1). The faunal material from each category is presented as a distinct data set.

Recovery of faunal remains involved both field and laboratory methods. Both the small (.25 m^2) and large (2 m^2 and 4 m^2) units were excavated in arbitrary 10 cm levels. The matrix from each level was processed through a 1/2 in. screen. Pit feature fill was similarly processed through 1/4 in. hardware cloth. A sediment sample was collected from each test unit level and from each pit feature for flotation processing in the laboratory. The resulting faunal assemblage samples both the macrofaunal and microfaunal components of each cultural context.

Methodology

Each faunal element was identified to the most refined taxonomic level possible through interpretation of various combinations of anatomical features. Material that could not be minimally identified to

the family level was considered indeterminate. Other observations include the side and portion of the element; status of epiphyseal fusion; description of butchering cuts; description of cultural modified elements; sun-bleaching, weathering, and staining; degree of burning; and differential recovery data generated from the analysis of flotation samples.

Burned bone was placed into one of four categories based on color: 1) unburned or questionable (pale yellow, yellow, and yellowish-brown); 2) burned brown (brown, reddish-brown, and gray-brown); 3) burned black (black, black-and-brown); 4) calcined white (any combination of white, and gray, black, blue-green, or blue-gray). These categories are adapted from Shipman et al. (1984:311-314). Each category roughly represents a temperature range above which changes in color, morphology, and crystal structure occur (Shipman et al. 1984). Faunal material that was completely whitened throughout was placed in a calcined/bleached category. Since calcination and bleaching are interpreted differently in terms of c- and n-transforms (Schiffer 1972; Schiffer and Rathje 1973), it is important to make this distinction during analysis. All faunal remains are listed by the number of identified specimens (NISP) in Tables 20 through 23.

Composition of the Sample

For this analysis, the general categories of Mississippian and Late Woodland will be used. Cultural deposits were encountered to a depth of approximately 50 cm. Site disturbance from plowing (i.e., the plow zone) was confined to the top 20 cm (levels 1 and 2). Cultural materials recovered from these upper levels contained both Mississippian and Late Woodland artifacts. Level three (20-30 cm) was predominantly Late Woodland. The fourth level (30-40 cm) contained mixed Late and Middle Woodland deposits. The fifth excavation level (40-50 cm) contained artifacts attributed exclusively to Middle Woodland (Crab Orchard occupations). Excavations ceased at the culturally sterile yellow clay encountered at approximately 50 cm.

Crab Orchard. The single Crab Orchard feature (feature 45) contained five bone fragments, one from a bird and two from large mammals (Table 22). This material could not be identified to the species level.

Late Woodland. Twenty pit features and two post molds determined to be of Late Woodland origin produced 93.9% (n=359) of the total faunal assemblage (Table 20). The identified subassemblage comprises 10.6% (n=38) of this material. The general condition of this subassemblage is summarized in Table 21. In order of most frequent recovery, the represented taxa include white-tailed deer, toad, raccoon, box turtle, and rabbit. White-tailed deer were the most ubiquitous species, occurring in 30% (n=6) of the features (including posts). Indeterminate large mammal bone fragments probably attributable to the white-tailed deer were recovered from four additional features (Table 20). The recovery of a set of very worn upper right molars from feature 20, plus two fragmented juvenile deer teeth from feature 16, suggests that a

Table 20. Inventory of Faunal Remains from Late Woodland Pit Features.

Taxa	Feature No. 7 *C	7 D	10 C	10 D	10 E	13 B	13 E	15 B	15 C	15 D	15 E	16 B	19 C	19 D	19 E	19 F
AMPHIBIA																
cf. Bufo sp.																
Toad																
REPTILIA																
Terrapene sp.																
Box Turtle								1	1							
MAMMALIA																
Procyon lotor																
Raccoon																
Sylvilagus sp.																
Rabbit																
Odocoileus virginianus																
White-tailed deer						1						2				
Total Identified						1		1	1			2				
INDETERMINATE REMAINS																
Gastropoda							1									1
Osteichthyes		1														
Serpentes																
Testudines									1	3		1				
Mammalia	1		3	2		3			2							
Mammalia, large												2				
Mammalia, large (Probably Deer)			1										1			
Vertebrata		2	4	7	4		1			4	1		1	4	1	
Total Indeter.	1	2	8	10	4	3	2		3	7	1	3	2	4	1	1
TOTAL NISP	1	2	8	10	4	4	2	1	4	7	1	5	2	4	1	1

*Recovery Size: B - >1/4 in. screen
C - >5 mm flotation
D - 3-5 mm flotation
E - 2-3 mm flotation
F - <2 mm flotation

Table 20. (cont'd).

Taxa	Feature No. 20 *B	20 C	20 D	20 E	24 B	24 C	24 D	24 E	25 C	25 D	28 C	39 C	42 D
AMPHIBIA													
cf. Bufo sp. Toad													
REPTILIA													
Terrapene sp. Box Turtle													
MAMMALIA													
Procyon lotor Raccoon						1			1				
Sylvilagus sp. Rabbit							1						
Odocoileus virginianus White-tailed deer	4				8	1	2						
Total Identified	4				8	2	3		1				
INDETERMINATE REMAINS													
Gastropoda													
Osteichthyes			1										
Serpentes		1	1										
Testudines		1	1										
Mammalia	3		2	1	1	9	12		1			3	
Mammalia, large	3					4	4						
Mammalia, large (Probably Deer)					7								
Vertebrata		3	4			9	71	5	3	7	1	4	2
Total Indeterminate	6	5	9	1	8	22	87	5	4	7	1	7	2
TOTAL NISP	10	5	9	1	16	24	90	5	5	7	1	7	2

Table 20. (cont'd).

Taxa	Feature No. 41 *D	41 E	47 C	47 D	48 B	48 C	48 D	48 E	48 F	57 B	57 C	57 D
AMPHIBIA												
cf. Bufo sp. Toad												
REPTILIA												
Terrapene sp. Box Turtle												
MAMMALIA												
Procyon lotor Raccoon												
Sylvilagus sp. Rabbit												
Odocoileus virginianus White-tailed deer												
Total Identified												
INDETERMINATE REMAINS												
Gastropoda									1			
Osteichthyes												
Serpentes												
Testudines												
Mammalia						4				2	4	6
Mammalia, large					1						1	
Mammalia, large (Probably Deer)			1									
Vertebrata	1	1	6	3			8	1			1	
Total Indeterminate	1	1	7	3	1	4	8	1	1	2	6	6
TOTAL NISP	1	1	7	3	1	4	8	1	1	2	6	6

Table 20. (cont'd).

Taxa	Feature No. 61 *B	61 C	61 D	61 E	63 B	63 C	66 C	70 C	Posts 20 C	20 D	20 E	21 B	Tot
AMPHIBIA													
cf. Bufo sp. Toad									6	5	1		12
REPTILIA													
Terrapene sp. Box Turtle													2
MAMMALIA													
Procyon lotor Raccoon													2
Sylvilagus sp. Rabbit													1
Odocoileus virginianus White-tailed deer	2							1					21
Total Identified	2							1	6	5	1		38
INDETERMINATE REMAINS													
Gastropoda													3
Osteichthyes													1
Serpentes			1										3
Testudines		5	1						2	1			16
Mammalia	8	4	4			1						2	73
Mammalia, large	4						1						20
Mammalia, large (Probably Deer)					1							1	11
Vertebrata		5	12	1	5	1	1			1	2		170
Total Indeterminate	12	14	18	1	6	2	2		2	2	2	3	297
TOTAL NISP	14	14	18	1	6	2	2	1	8	7	3	3	335

Table 21. Condition of Faunal Remains from Late Woodland Pit Features.

Status	Feature No. 7		10			13		15				16	19			
	*C	D	C	D	E	B	E	B	C	D	E	B	C	D	E	F
Unburned/question.			3	7	4		1					3			1	1
Burned brown		1	1			1										
Burned black	1		1						2	3	1					
Calcined white			1	1			1		2	3				1		
Burned/stained			2			3							2	3		
Calcined/bleached								1		1						
Friable			1			1										
Modified			1													

Status	Feature No. 20				24				25		28	39	42
	*B	C	D	E	B	C	D	E	C	D	C	C	D
Unburned/questionable	1		2		6	7	26	3	1			1	
Burned brown	1	3	3		1	8	16	2	1		1	3	1
Burned black			1				22						
Calcined white		1	1			1	9		3	7			1
Burned/stained	8				9	7						3	
Calcined/bleached		1	2	1		1	17						
Modified					1								

Status	Feature No. 41		47		48					57		
	D	E	*C	D	B	C	D	E	F	B	C	D
Unburned/question.									1	2	4	6
Burned brown	1		1	1			1			1		
Calcined white		1	4	2	1	2	7			1		
Calcined/bleached			2			2		1				
Modified			1									

Status	Feature No. 61				63		66	70	Posts 20			21	
	*B	C	D	E	B	C	C	C	C	D	E	B	Tot
Unburned/questionable	14	3	9						6	6	3		121
Burned brown			1			2							51
Burned black		4	1									3	39
Calcined white					4		2						58
Burned/stained		6	2	1	2				2	1			51
Calcined/bleached		1	5					1					36
Friable	1				1								3
Modified									1?				5

*Recovery Size: B - >1/4 in. Screen
C - >5 mm flotation
D - 3-5 mm flotation
E - 2-3 mm flotation
F - <2 mm flotation

Table 22. Inventory and Condition of Faunal Remains from Crab Orchard (Feature 45) and Features of Unassigned Cultural Affiliation.

Taxa	Feature No. 14 C	14 D	14 E	45 C	45 D	60 C	Total
Testudines	1	1					2
Aves				1			1
Mammalia	3				2		5
Mammalia, large (Probably Deer)	1						1
Vertebrata		7	1		2	1	11
TOTAL NISP	5	8	1	1	4	1	20
Status							
Unburned/questionable				1			1
Burned brown		1				1	2
Burned black	1				1		2
Calcined white	2	2					4
Calcined/bleached	2	5	1			1	9

*Recovery Size: C - >5 mm flotation
D - 3-5 mm flotation
E - 2-3 mm flotation

Table 23. Inventory and Condition of Faunal Remains from Mixed Cultural Proveniences.

Taxa	*Component: / Test Unit No. / **Recovery Size:	X 16 A	X 28 A	Y 23 A
REPTILIA				
Terrapene sp.				
Box Turtle			1	
MAMMALIA				
Odocoileus virginianus				
White-Tailed Deer		1		
Total Identified		1	1	
Indeterminate Remains				
Mammalia, large				
(Probably Deer)				1
Total Indeterminate				1
TOTAL NISP		1	1	1
Status				
Unburned/questionable			1	1
Burned/stained		1		
Butchered		1?		

* Component: X - Mixed Mississippian and Late Woodland (0-20 cm)
Y - Mixed Late and Middle Woodland (30-40 cm)

** Recovery Size: A - >1/2 in. screen

least two individuals of different age groups were taken. A piece of worked antler indicates the procurement of a male deer. The presence of nearly all the elements of the deer skeleton (i.e., skull, cervical and lumbar vertebrae, ribs, ulna and radius, carpals, femur, tarsals, metapodial, and phalanges) indicates that the entire animal was returned to the site for processing. However, butchering and skinning cut marks are completely lacking from these materials.

The 12 bone fragments of a toad recovered from post mold 20 suggest the interment of an intrusive individual. Such an occurrence could taken place (1) when the post hole itself was left open, (2) if the toad remains were first located in the sediment used to fill in around around the post, or (3) if the toad was placed into the hole intentionally. Only three of the fragments appeared to have been burned or stained.

Deer, raccoon, and rabbit represent a species complex characteristic of forest edge and woodland habitats. Each is active throughout the year. Box turtle and toad are available primarily during the warmer seasons. Except for deer, only a single individual of each species is represented. A single bird bone fragment, three snake vertebrae, and three terrestrial gastropods were found among the indeterminate remains (Table 20).

Five culturally modified elements were recovered from Late Woodland deposits. Their descriptions are provided below.

1. Feature 10: This indeterminate large mammal bone consists only of the working edge of an indeterminate tool. Several diagonal striations are evident on one surface. The working end is smoothed, somewhat rounded, and has one pointed aspect.

2. Feature 13: A modified proximal phalanx (digit 3 or 4) of a white-tailed deer came from feature 13. The proximal 10 mm has been removed. The resultant proximal end is flat, smoothed, slightly polished, and partially burned brown (probably as a method of tempering the bone). The medullary cavity has been partially reamed out. The distal end was perforated from the outside and has a small (7 mm x 2 mm), narrow slot between and parallel to the articular surfaces. The tempering technique evident on this specimen has recently been observed on the distal end of a deer phalanx (?) recovered from probable Late Stirling-Early Moorehead phase midden deposits at the Kruze site (11-Mo-507) in Monroe County, Illinois (Bloom 1985). In the latter case, the artifact probably represents a ring/cup-and-pin game piece (Culin 1907; Guilday 1963). The artifact from the Lightfoot site may not have been a game piece due to the extremely small, narrow distal aperture. However, it may have served as an element in a chime.

3. Feature 24: One worked antler tine fragment of a white-tailed deer revealed modifications. The proximal end, though incomplete, is rounded from use, probably as a chert working tool. This aspect is also slightly burned brown, probably to temper the working edge. The distal end is broken off. The present maximum length is 49 mm. The maximum diameter is 15 mm.

4. Feature 47: One indeterminate metaphyseal fragment has longitudinal striae on its exterior surface.

5. Post mold 20: One indeterminate turtle shell fragment possibly has a slight polish on its exterior surface.

Indeterminate. The cultural association of two pit features (14 and 60) containing faunal remains could not be determined. This subassemblage (n=15), containing only indeterminate material, is summarized in Table 22. The flotation sample from feature 14 yielded the only evidence of fish utilization (an indeterminate vertebra) recovered from the Lightfoot site.

Excavation Units. Two 10 cm levels of three 2 m^2 test units produced faunal material (n=3). Each of these levels contained mixed cultural deposits. This subassemblage is summarized in Table 23. Level 2 (10-20 cm) of test unit 16, containing mixed Mississippian and Late Woodland deposits, produced the postero-proximal fragment of a white-tailed deer metacarpal which exhibits possible butchering cuts on the proximal-lateral aspect about 5 mm distal to the proximal end. This is the only evidence of butchering techniques recovered from the Lightfoot site.

Conclusions

In total, 382 pieces of faunal material recovered from the multicomponent Lightfoot site during the 1983 and 1984 field seasons were analyzed. Of the total faunal assemblage, 93.9% is attributable to the Late Woodland occupation. White-tailed deer was the most frequently exploited animal species. Species of secondary importance to the site inhabitants include raccoon, rabbit, and box turtle. Although white-tailed deer of different age groups were exploited and returned to the site for processing, elements revealing the patterns of animal butchery were completely lacking from the Late Woodland component. Also, the paucity and nature of the faunal assemblage precludes a detailed interpretation of the local environment and seasonal exploitation patterns. Apparently, birds (including waterfowl) and fish played a minor part of Late Woodland subsistence at the Lightfoot site. Faunal material recovered from proveniences of mixed or indeterminate cultural affiliation were of little interpretational value.

Ethnobotanical Analysis (Candace J. Lutzow)

Introduction

Botanical material of 18 flotation samples collected from prehistoric pit features at the Lightfoot site was analyzed. This aggregate sample represents 32% of all flotation samples collected from pit features at the site. All of the features except one (feature 45, of Middle Woodland Crab Orchard origin) are Late Woodland. Four of the 18 samples were previously analyzed by William Cremin of Western

Michigan University (Cremin 1985a); the remaining 14 samples were analyzed by the author. All summary data incorporate both analyses.

Methodology

Identified materials were placed into three major categories: seeds, nut fragments, and charcoal fragments. Each sample was initially scanned for seeds and seed remnants, all of which were removed for identification. Remaining material--nutshell and charcoal fragments--was subdivided into two categories based upon size. Those greater than 2 mm were counted, weighed, and examined for identification; those less than 2 mm were weighed and either identified to the general categories of nut fragments and charcoal fragments or regarded as residue, an indistinguishable class of charred plant remains. Much of the preserved plant material excavated at the Lightfoot site was minutely fragmented, preventing identification. Sorted samples were weighed on an OHAUS triple beam balance to within 0.05 g; these measurements were recorded and analyzed. A low magnification (10x-30x) binocular microscope was employed to aid in sample identification.

Seed identification was accomplished with the aid of two manuals: The Seed Identification Manual (Martin and Barkley 1961) and Seeds and Fruits of Eastern Canada and the Northeastern United States (Montgomery 1977). External topographic characteristics useful in the identification of seeds are shape, size, seed coat surface texture, and the placement of the hilum (Esau 1977). Since charring can significantly alter the shape and general appearance of a seed (Renfrew 1973; Shea 1977), it is important to compare a charred specimen with an uncharred specimen. A seed type collection prepared by American Resources Group, Ltd., was consulted to verify identifications. The number of seeds or seed fragments per feature sample was considered more pertinent for analysis rather than weight due to the negligible weight contributed by most seeds.

Identification of nut fragments at the general level was aided by the USDA manual, Seeds of the Woody Plants in the United States (1974). Also helpful were comparisons of the sample materials with a nut type collection maintained at American Resources Group. Ltd. Four nut genera were identified in the sample of materials from the Lightfoot site: hickory (Carya), hazelnut (Corylus), acorn (Quercus), and walnut (Juglans). A brief description of the morphological characteristics used in the identification of these nut types is presented below.

Hickory nutshell, in general, has a distinctive angular appearance with a thick lobe measurement in comparison with other nutshell types. The shell lobe thickness varies somewhat depending on the species. Measurement of shell lobe thickness (as outlined by Lopinot 1984) was employed in assigning hickory nut fragments to species. Bitternut (Carya cordiformis) and pecan (C. illinoensis) have a discernible thin shell-lobe thickness (a mean measuremanet of 0.5 mm for bitternut and 0.8 mm for pecan); shellbark (C. lacinosa) and mockernut (C. tomentosa) have distinguishable thick shell-lobe measurements (a mean measurement of 3.7 mm and 3.2 mm respectively); the remaining potentially available

hickory species (pignut, C. glabra; shagbark, C. ovata; and oval pignut, C. ovalis) are difficult to distinguish based upon thickness alone, all averaging a mean thickness of 1.6 mm. Shell fragments generally do not provide an adequate amount of material to determine the species identity of these three species.

Hazelnuts have a distinctive channel aligned vertically within the outer section of the shell. These channels appear as grooves on the outside of the shell. The presence of such channels on a nut fragment makes for a positive identification as a hazelnut (Bragg 1983). When a fragment does not contain a portion of a channel, identification is difficult and was not attempted in the present study.

Acorns have the thinnest nutshells of the nuts recovered from the Lightfoot site samples. This thinness facilitated identification, as did other features such as the presence of distinctive striations common on the outer shell and a brittle and chipping inner membrane on the interior shell surface (Bragg 1983).

Walnut shell is characterized by raised, corrugated exterior ridges and ragged, pointed interior ridges. These distinctive interior and exterior ridges facilitated identification of preserved charred shell fragments.

Wood charcoal fragments from each sample were sorted into two categories: those greater than 2 mm and those less than 2 mm. The smaller fragments were weighed and regarded as residue. The larger fragments were weighed and counted. These fragments were subsequently viewed under the binocular microscope for identification. Manuals employed in identification were: Wood Structure and Identification (Core et. al. 1976) and Textbook of Wood Technology (Panshin and de Zeeuw 1980). A wood type collecton was also consulted for the purpose of comparison. Many of the charred wood samples were less than 2 mm in size, making identification either to species, or even to genus level, difficult or impossible. Specimens which could not be identified to genus or familial level were grouped into the two general categories of ring-porous or diffuse-porous wood, differentiation based upon pore or vessel distribution pattern within a growth ring. Unidentifiable samples were simply weighed and counted.

Pre-settlement Vegetation

Analysis of prehistoric environmental resource utilization is contingent upon knowledge of the environmental context in which a culture has evolved adaptive strategies. A model of potentially available botanical materials is prerequisite to the formulation of exploitation and activity hypotheses based upon the botanical products and by-products recovered from an archaeological site. The identification and analysis of carbonized plant materials obtained through site excavations can offer clues concerning the plant-human relationship existant at the time of site formation. Considering factors such as potential food biomass, spatial distribution of resources, ease of exploitation, taste preferences and nutritional

value, as well as post-site depositional alterations (such as loss of material due to soil acidity, moisture, plowing and disking, erosion, trampling, bioturbations, or weed seed contamination), field recovery, laboratory preparation and analysis distortions, one can cautiously formulate hypotheses concerning general botanical exploitation (Lopinot 1984).

Reconstruction of vegetation patterns antecedent to historical settlement is typically formulated from the records of United States Government General Land Office (GLO) surveys. GLO records applicable to the Northfield, Burning Star Mine #4 research area were critically reviewed by Elliot and Voigt (1980). Synthesis of the GLO data, together with data derived from studies associating soil types with vegetational patterns (Denny 1972; Haas and McNerney 1986) and hypotheses relating an affinity of floral associations determined by soil moisture availability, has provided a tentative presettlement vegetation model. Geographical determination of vegetation zones is substantiated by Zawacki and Hausfater (1969), who utilized similar synthetic methods of restructuring prehistoric vegetational patterns in the lower Illinois River valley.

Presettlement vegetation reconstruction models for the Northfield area of the upper Galum Creek valley ascribe prairie to the upland areas (17% of total areal land mass) and lowland to upland woods associations on the remaining areal land mass (83%) (Elliot and Voigt 1980). Dominant woodland species within this area were determined on the basis of average available soil moisture. The floral patterns existant in the upper Galum Creek valley prior to intensive agricultural disturbance correlate with those elucidated in recent ecological studies of nondisturbed areas (Mohlenbrock 1975; Mohlenbrock and Voigt 1959; Voigt and Mohlenbrock 1964; Voigt and Mohlenbrock n.d.). These patterns have been described in Chapter I. Within this vegetational mosaic of prairie and forest, a variety of potential economic plant species was available at varying periods throughout the yearly 165 day growing season (Denny 1972; Haas and McNerney 1986; Lopinot 1984).

Results

The analyzed botanical sample from the Lightfoot site consisted of a combined count of 247 carbonized fragments of nutshell, wood, and seeds, aggregating a total weight of 14.65 g (Tables 24-26).

Nutshell contributed the greatest amount of botanical material in number (185 fragments greater than 2 mm in size) and weight (7.5 g), representing 65.7% of the total botanical material identified (Table 24). Fifteen of the 18 features analyzed (83.3%) contained nut debitage. The combined fragmented nutshell assemblage consisted of hickory (155 fragments, 5.3 g), pecan (14 fragments, 0.5 g), hazelnut (10 fragments, 1.0 g), walnut (5 fragments, 0.65 g), and acorn (1 fragment, 0.05 g) (Table 27).

Nine charred seeds were recovered from the fill of five Late Woodland features (27.8% of the analyzed features) (Table 25). These

Table 24. Nut Remains from Sample Features by Count and Weight (g).

Genus/Species	Feature Number 7 #/Wt	12 #/Wt	13 #/Wt	15 #/Wt	16 #/Wt	20 #/Wt	21 #/Wt	22 #/Wt	23 #/Wt	25 #/Wt	27 #/Wt
Carya spp. Hickory	20/0.6	1/<0.05	3/0.1	13/0.25	2/0.05			8/0.4	11/0.2	10/0.4	
C. laciniosa Kingnut/shellbark hickory		1/<0.05									
C. ovata Shagbark hickory											
C. illinoensis Pecan					1/<0.05			6/0.2			
Corylus americana Hazelnut				1/<0.05	2/0.05			3/0.7			
Juglans nigra Black walnut				2/0.05							
Quercus spp. Acorn											
Unidentifiable											

Genus/Species	Feature Number 28 #/Wt	39 #/Wt	41 #/Wt	45 #/Wt	48 #/Wt	55 #/Wt	61 #/Wt	Totals #/Wt	Ubiquity Index (%)
Carya spp. Hickory	11/0.25	2/0.1	28/1.05	20/0.7	22/0.7	3/0.10		152/4.95	77.7
C. laciniosa Shellbark hickory			1/0.15					2/0.2	11.1
C. ovata Shagbark hickory					1/0.15			1/0.15	5.6
C. illinoensis Pecan		1/0.05	6/0.2					14/0.5	22.2
Corylus americana Hazelnut		2/0.1	1/0.05				1/0.05	10/1.0	33.3
Juglans nigra Black walnut				1/0.3		2/0.3		5/0.65	16.7
Quercus spp. Acorn	1/<0.05							1/0.05	5.6
Unidentifiable			3/0.1					3/0.1	5.6

Table 25. Seeds from Sample Features by Count.

Genus/Species	Feature Number										
	7	12	13	15	16	20	21	22	23	25	27
Carbonized											
Chenopodium album Lamb's-quarters									1		
Lespedeza sp. Lespedeza	3						1				
Polygonum spp. Smartweed/knotweed							1				
Rumex sp. Dock							1				
Unidentifiable											
TOTAL CARBONIZED SEEDS	3						2		1		
Uncarbonized											
Acalypha spp. Copperleaf		3									
Amaranthus spp. Pigweed	2						2				2
Ambrosia artemisiifolia Common ragweed		11						14	1		
Chenopodium album Lamb's-quarters		65				5	11		28	18	
Lespedeza spp. Lespedeza									1		
Phytolacca americana Pokeweed/polk										1	1
Polygonum spp. Smartweed/knotweed	3					1	1				
P. pennsylvanicum Pinkweed/pink smartweed		1					1				
Rudbeckia laciniata Coneflower		12							13		
Rumex spp. Dock							1				
R. crispus Curly dock							1				
Setaria spp. Foxtail		2			5				7		6
S. glauca Yellow foxtail							5				
TOTAL UNCARBONIZED SEEDS	5	94			5	6	22	14	50	19	9

Table 25. (Cont'd).

Genus/Species	Feature Number 28	39	41	45	48	55	61	Totals	Ubiquity Index (%)
Carbonized									
Chenopodium album Lamb's-quarters			2					2	5.6
Lespedeza sp. Lespedeza								1	5.6
Polygonum spp. Smartweed/knotweed								4	11.1
Rumex sp. Dock								1	5.6
Unidentifiable	1							1	5.6
TOTAL CARBONIZED SEEDS	1		2					9	27.8
Uncarbonized									
Acalypha spp. Copperleaf								3	5.6
Amaranthus spp. Pigweed								6	16.7
Ambrosia artemisiifolia Common ragweed							12	38	22.2
Chenopodium album Lamb's-quarters	5		37					169	38.9
Lespedeza spp. Lespedeza								1	5.6
Phytolacca americana Pokeweed/polk								2	11.1
Polygonum spp. Smartweed/knotweed								5	16.7
P. pennsylvanicum Pinkweed/pink smartweed								2	11.1
Rudbeckia laciniata Coneflower								25	11.1
Rumex spp. Dock								1	5.6
R. crispus Curly dock								1	5.6
Setaria spp. Foxtail							1	21	27.8
S. glauca Yellow foxtail								5	5.6
TOTAL UNCARBONIZED SEEDS	5	0	37	0	0	0	13	279	66.7

Table 26. Charcoal from Sample Features by Count and Weight (g).

Genus/Species	Feature Number 7 #/Wt	12 #/Wt	13 #/Wt	15 #/Wt	16 #/Wt	20 #/Wt	21 #/Wt	22 #/Wt	23 #/Wt	25 #/Wt	27 #/Wt
Fagus grandifolia American beech											
Acer spp. Maple							6/0.3				
Fraxinus spp. Ash								1/0.1			
Quercus spp. Oak										1/0.05	
Ulmus rubra Slippery elm					1/0.1						
Ring-porous			3/0.1		1/0.05			6/0.6		3/0.1	
Diffuse-porous		1/<0.05	2/0.05								
Unidentifiable					4/0.1	1 /0.1	3/0.15	2/<0.05	2/0.1	1/<0.05	
Bark: Type 1			1/<0.05								
Type 2									2/0.1		
TOTAL CHARCOAL	0	1/<0.05	6/0.2	0	6/0.25	1/0.1	9/0.45	9/0.75	4/0.2	5/0.2	

Genus/Species	Feature Number 28 #/Wt	39 #/Wt	41 #/Wt	45 #/Wt	48 #/Wt	55 #/Wt	61 #/Wt	Totals #/Wt	Ubiquity Index (%)
Fagus grandifolia American beech					1/0.8			1/0.8	5.6
Acer spp. Maple								6/0.3	5.6
Fraxinus spp. Ash							7/0.9	8/1.0	11.1
Quercus spp. Oak								1/0.05	5.6
Ulmus rubra Slippery elm								1/0.1	5.6
Ring-porous	8/0.2						3/0.1	24/1.15	33.3
Diffuse-porous								3/<0.1	11.1
Unidentifiable	13/0.3						6/0.5	32/1.35	44.4
Bark: Type 1								1/<0.05	5.6
Type 2								2/0.1	5.6
TOTAL CHARCOAL	21/0.5	0	0	0	1/0.8	0	16/1.5	79/5.0	61.0

Table 27. Totals of Nut Types from Sample Features by Count and Weight (g).

Genus/Species	Feature Number 7 #/Wt	12 #/Wt	13 #/Wt	15 #/Wt	16 #/Wt	20 #/Wt	21 #/Wt	22 #/Wt	23 #/Wt	25 #/Wt	27 #/Wt
Carya spp. Hickory	20/0.6	2/<0.1	3/0.1	13/0.25	2/0.05			8/0.4	11/0.2	10/0.4	
C. illinoensis Pecan					1/<0.05			6/0.2			
Corylus americana Hazelnut				1/<0.05	2/0.05			3/0.7			
Juglans nigra Walnut				2/0.05							
Quercus spp. Acorn											
TOTAL NUTSHELL	20/0.6	2/<0.1	3/0.1	16/0.35	5/0.15	0	0	17/1.3	11/0.2	10/0.4	0

Genus/Species	Feature Number 28 #/Wt	39 #/Wt	41 #/Wt	45 #/Wt	48 #/Wt	55 #/Wt	61 #/Wt	Totals #/Wt	Ubiquity Index (%)
Carya spp. Hickory	11/0.25	2/0.1	29/1.2	20/0.7	23/0.85	3/0.1		155/5.3	77.8
C. illinoensis Pecan		1/0.05	6/0.2					14/0.5	22.2
Corylus americana Hazelnut		2/0.1	1/0.05				1/>0.05	10/1.0	33.3
Juglans nigra Walnut				1/0.3		2/0.3		5/0.65	16.7
Quercus spp. Acorn	1/<0.05							1/0.05	5.6
TOTAL NUTSHELL	12/0.3	5/0.25	39/1.45	21/1.0	23/0.85	5/0.4	1/>0.05	185/7.5	83.3

were smartweed (Polygonum spp.; n=4), dock (Rumex sp.; n=1), lespedeza (Lespedeza sp.; n=1), and lamb's-quarters (Chenopodium album; n=2). Seeds were not recovered from the Crab Orchard feature.

Twelve features, or 66.7%, contained uncarbonized seeds. These seeds have been identified to the genus level and are listed in Table 25. All of the fresh seeds represent weedy plants indicative of disturbed, open areas. The modern location of the Lightfoot site was in a fallow agricultural field, an ideal habitat for adventitious species. The identified ruderal seeds all mature during the mid-summer to late-summer months. As the site was stripped and excavated during July and August, it is highly probable that these seeds were scattered and contaminated feature fills as excavation was occurring.

Charcoal was present in 11 (61%) of the analyzed samples (Table 26). Seventy nine fragments of burned wood were counted, weighing a total of 5.0 g (37.7% of the total plant material analyzed). Identified genera and species were maple (Acer spp.; n=6, 0.3 g), oak (Quercus sp.; n=1, 0.05 g), ash (Fraxinus spp.; n=8, 1.0 g), American beech (Fagus grandifolia; n=1, 0.8 g), and slippery elm (Ulmus rubra; n=1, 0.1 g) (Table 27). Thirty two minute fragments weighing a total of 1.35 g were unidentifiable. The remaining 1.25 g of charred wood fragments were categorized either as diffuse-porous (n=3, 0.1 g) or as ring-porous (n=24, 1.15 g). Table 28 lists potentially available diffuse-porous and ring-porous trees in the Lightfoot site area.

Three charred fragments of bark weighing a total of 0.15 g were obtained from two samples. These represented two different types of bark, but neither was of sufficient size to enable identification.

Discussion

The Lightfoot site is a multicomponent site with a predominant Late Woodland occupation. Flotation samples from the wall trenches of the Mississippian structure were not analyzed botanically due to the probability of contamination from earlier cultural occupations. One Woodland period Crab Orchard feature was investigated. The 17 features within the botanical sample are all of Woodland affiliation. The plant material from feature 45, the single Crab Orchard feature at the site, was limited to 0.7 g (20 fragments) of hickory nutshell and 0.3 g (1 fragment) of walnut shell. Seeds, cultigens, or charcoal were not identified within this sample (Cremin 1985). This limited assemblage, predominated by hickory nut debitage, is consistent with food material recovered from nearby Middle Woodland (Cremin 1978; Jefferies 1987; Santeford and Lopinot 1978) and comparable sites in the American Bottom (Johannessen 1983, 1984) and also the lower Illinois River valley (Asch and Asch 1985) northwest and northeast of the Lightfoot site, respectively. The absence of charcoal indicates that burning was not a major function of this feature. The lack of charcoal and seeds within the feature fill may indicate that feature 45 was used to store nuts gathered at the site or, more simply, that nuts were gathered and consumed at this feature location.

Table 28. Diffuse-Porous and Ring-Porous Trees in the Upper Galum Creek Valley.

Tree Species	Diffuse-Porous	Ring-Porous
Acer spp. (soft and hard)	X	
Betula spp.	X	
Carya spp.		X
Castanea dentata		X
Celtis spp.		X
Cornus spp.	X	
Diospyros virginiana		X
Fagus grandifolia	X	
Fraxinus spp.		X
Gleditsia triacanthos		X
Gymnocladus dioicus		X
Juglans spp.		X
Liquidambar styraciflua	X	
Liriodendron tulipifera	X	
Maclura pomifera		X
Morus rubra		X
Nyssa spp.	X	
Ostrya virginiana	X	
Platanus occidentalis	X	
Populus spp. (cottonwood)	X	
Prunus serotina	X	
Quercus spp. (red and white)		X
Robinia pseudoacacia		X
Salix nigra	X	
Sassafras albidum		X
Tilia spp.	X	
Ulmus spp.		X

Adapted from Panshin and de Zeeuw (1980)

The Late Woodland component at the Lightfoot site exhibits a pattern of wild food crop exploitation similar to that of other Late Woodland sites in the Galum Creek watershed area (Cremin 1985a, 1985b; Pulcher 1974b; Zalucha et al. n.d.), the greater Big Muddy River drainage basin (Cremin 1985a, 1985b; Denny 1972), the Kaskaskia River valley (Pearsall 1982), the lower Illinois River valley (Asch and Asch 1985), the Mississippi River valley in westcentral Illinois (Asch and Asch 1985), and the American Bottom (Johannessen 1983, 1984). Divergence from Middle Woodland food exploitation patterns is indicated by the utilization of a wider variety of nut crops with an associated decrease in the importance of walnut in the general nut assemblage. Additionally, the overall dependence upon nut crops gives way to an increased utilization of wild seed crops and possible cultivation of

indigenous starchy seeds such as maygrass (Iva annua), lamb's-quarters, and knotweed (Asch et. al. 1979).

The most significant factor for the purpose of use analysis is the paucity or absence of certain taxa in the analyzed botanical assemblage. The weight ratio of charcoal to nutshell is typically about two to one for Late Woodland sites (Johannessen 1983, 1984; Pearsall 1982). At the Lightfoot site, the ratio is reversed nearly two to one in favor of nuts over charcoal. Caches of starchy seeds typically associated with Late Woodland occupations, such as maygrass, lamb's-quarters, and knotweed (Cremin 1985a, 1985b; Johannessen 1983, 1984; Pearsall 1982; Pulcher 1974b; Zalucha et al. n.d.) are absent. Cultivated species associated with Late Woodland sites and found in aggregated quantities at the nearby Jamestown site, an organized Late Woodland community (Cremin 1985b), are poorly represented here. The limited botanical assemblage indicates that the Lightfoot site was either a short-term or seasonally occupied site with a site-specific exploitation strategy.

The recovered plant remains are restricted to late summer to early fall maturing indigenous species. Three of the four seed types identified (Chenopodium, Polygonum, and Rumex) have known food value to Late Woodland cultures (Asch et. al. 1979), but the small aggregate total (eight) of these seeds recovered makes intentional deposition a questionable hypothesis. These seeds, as well as the fourth seed taxon identified (Lespedeza) are typical of open disturbed areas and edges of woods (habitat of probable existance on this upland bluff site) and could have unintentionally entered the cultural fill. The major significance of these seeds is in depicting seasonality of site occupation. These weedy seed species, three of which are thought to have functioned as starchy dietary sources (knotweed, lamb's-quarters, and dock), bloom during late spring and early summer with seed maturity taking place in mid-summer (Voigt and Mohlenbrock n.d.).

Nut meat was of major importance as a food source at the Lightfoot site based upon the quantity of preserved material recovered. Of the identified nuts, hickory predominated by an approximate weight ratio of two to one over the combined weight total of the remaining nuts (pecan, hazelnut, walnut, and acorn). Availability of the nut taxa identified in the feature fills can begin as early as August with the ripening of hazelnuts and continues through November or even December, if one considers the collection of ripe nuts which have fallen to the ground (USDA 1974) (Table 29).

The botanical assemblage indicates that the vegetational habitats exploited during the Late Woodland occupation of the site range from prairie and dry upland woods (post oak flats) to moist bottomland woods. Prehistoric occupation of the ridge spur containing the Lightfoot site allowed easy access to slope woodland habitat where three species of oak (Quercus alba, white; Q. rubra, red; and Q. velutina, black) predominate along with two species of hickory (Carya glabra, pignut and C. ovata, shagbark) (Voigt and Mohlenbrock 1964). All three oak species produce edible nuts (USDA 1974). Of the wide variety of hickories available and potentially harvested by prehistoric groups, pignut is one of the most

Table 29. Seasonal Availability of Mature Indigenous Nut Crops, Upper Galum Creek Valley.

Tree Species	Seasonal Availability			
	August	September	October	November
Carya laciniosa Shellbark hickory		X	X	X
C. glabra Pignut hickory		X	X	
C. illinoensis Pecan		X	X	
C. ovata Shagbark hickory		X	X	X
Corylus americana Hazelnut	X	X	X	
Juglans nigra Black walnut		X	X	X
J. cinerea Buttermut		X	X	X
Quercus alba White oak		X	X	
Q. rubra Red oak		X	X	
Q. velutina Black oak			X	

Sources: Denny 1972; USDA 1974; Zawacki and Hausfater 1969

abundant edible nut-producing species, while shagbark represents an edible species preferred by historic groups (Voigt and Mohlenbrock 1964). Carya laciniosa (shellbark hickory) is also typical to the moist slope woodlands but is not as prevalent as pignut and shagbark hickories. Juglans nigra (black walnut) is another potential nut resource common to slope woodland communities.

Nut crops available in the moister bottomland woods are J. cinerea (butternut, although not as common as black walnut in the slope woodlands) and C. illinoensis (pecan), which attains maximum size in river bottomland woods (Voigt and Mohlenbrock 1964). The most valuable nut resource available in the prairie and upland post oak flat habitat would have been hazelnut, typically occurring in thickets and also common to borders of woods (Voigt and Mohlenbrock 1964).

Representatives of hickory, acorn, walnut, and hazelnut species have been identified from the feature fills at the Lightfoot site, with hickory (typically the most abundantly available species) predominating in the assemblage. Oaks, although dominant in the local habitat, vary widely in production of large crops, with production varying in interval

from as little as one year (Q. palustris, pin oak and Q. falcata, spanish oak) to as much as 10 years (Q. alba) (USDA 1974).

The charred wood species identified (maple, ash, beech, slippery elm, and oak) indicate that moist slope to bottomland woods were most heavily exploited for combustible material. The seed taxa identified are adaptable to a wide range of disturbed habitats. In sum, bottomland to slope woodland habitat provided the large majority of botanical resources to the Lightfoot site inhabitants.

Conclusions

The predominance of nutshell, together with the low quantities of wood charcoal and seeds (including possible cultigens) indicates that prehistoric occupations at the Lightfoot site were probably short term and limited in function. The limited botanical assemblage is explicable when viewed in terms of the geographical and vegetational habitat in which the Lightfoot site is located. The site is situated on a narrow ridge spur with a steep slope to the east and a gradual slope to the west. Climax woodland habitat bordered the site along the ridge slopes extending down into the Galum Creek bottomland. Acorn, hickory, pecan, walnut, and hazelnut resources would all have been potentially plentiful to the site inhabitants in this mosaic of habitats (Voigt and Mohlenbrock 1964).

The narrow ridge spur and associated slope would have afforded little potential for cultivation of horticultural species or for the collection of exploitable wild seed species. In contrast, nut resources would have been plentiful and easily accessible, making nut collection a rational and efficient exploitation strategy. Alternately, this site could have functioned as a hunting site where nuts were the primary plant food consumed. The botanical assemblage additionally indicates that occupation was seasonally limited to late summer and early fall. The small amount (14.65 g) of material recovered suggests that population density at this site was low in comparison to the Late Woodland component at the Galum Crossing site (21C4-29), which yielded 602.8 g of preserved nutshell (Zalucha et al. n.d.), and the village community at the Jamestown site (21C4-14), which yielded 839.12 g of nutshell (Cremin 1985b). These sites are both much larger in size than the Lightfoot site, with long-term Late Woodland occupations.

In conclusion, with consideration of the overall Late Woodland cultural occupation in the vicinity of Galum Creek, it is probable that the Lightfoot site had an ancillary function to larger communities such as the Jamestown site (21C4-14) as a nut-gathering and/or hunting site utilized at specific seasonal periods by a small number of people. This hypothesis is supported by the general paucity of botanical material, the predominence of nutshell--especially hickory--in the assemblage, and the associated meager number of seeds and charcoal specimens recovered from features at the site.

CHAPTER VII. CONCLUSIONS

Mark J. Wagner

Introduction

The Lightfoot site (21C4-35) excavations recovered information regarding Archaic, Middle Woodland, Late Woodland, and Mississippian occupations in the upper Galum Creek valley. Middle (4000-3000 B.C.) and Late (2500-2000 B.C.) Archaic utilization of the site was indicated by the recovery of Etley and Karnak projectile points/knives. Late Archaic/Early Woodland period utilization was represented by Saratoga and Cypress cluster artifacts. Pit features relating to these occupations were not identified. The recovery of these early artifacts as isolated tools conforms to the documented Archaic settlement pattern in the area which consists of the utilization of ridge spurs overlooking the creek floodplains as short-term hunting and foraging camps.

Woodland period utilization of the site was represented by the base of a Snyders projectile point and a shallow basin (feature 45) containing Crab Orchard ceramics. Similar to the Archaic period occupation, the documented Early/Middle Woodland settlement pattern within that part of the Galum Creek valley contained within Burning Star Mine #4 consists of small sites with restricted artifact inventories. As with the Archaic sites, Woodland Crab Orchard occupations at these sites are interpreted as short-term occupations oriented toward the exploitation of seasonally available resources. The single Crab Orchard feature at the Lightfoot site contained hickory (Carya spp.) and walnut (Juglans spp.) shells, indicating a fall-early winter occupation possibly oriented toward nut collection and hunting.

The Late Woodland occupation is the most intensive occupation at the site, with at least 33 pit features and a possible pole structure attributed to this occupation. A single radiocarbon date of 1370±70 B.P. (A.D. 580±70) was obtained on a shallow pit feature containing Late Woodland body sherds. The Lightfoot site is interpreted as representing a small, seasonally occupied camp during this time period. This interpretation is based on the relatively small site size, the absence of an organized community plan containing discrete feature clusters, the lack of pit houses, and the restricted artifact inventory.

The following discussions of seasonality of occupation, material culture, and site activities are restricted to the Late Woodland occupation of the site. The Mississippian occupation is summarized following these discussions.

Seasonality of Occupation

Occupation of the site during the late summer and fall is indicated by the presence of nuts which are available for collection from August to November (Table 29). Additionally, the presence of five deep pits that represent possible storage facilities could be indicative of a late fall-early winter occupation. The small faunal assemblage was dominated by terrestrial mammalian species--deer, raccoon, and rabbit--characteristic of forest edge and woodland habitats and which are available on a year-round basis. Warm weather species were poorly represented, consisting of a very small amount of box turtle, snake, and toad remains. The low representation (n=1) of fish in the faunal assemblage may be an indication that the site was occupied during the colder months. Fish and other bottomland species are well represented in Late Woodland faunal assemblages from the larger Jamestown (21C4-14) and Galum Crossing (21C4-29) sites (Barr and Bloom n.d.; Falk n.d.), and their low frequency at the Lightfoot site may have a seasonal basis.

Subsistence

The plant food remains from the Lightfoot site botanical samples were dominated by carbonized nut fragments. Starchy seed complex plants such as chenopodium and Polygonum that occur in significant quantities at Late Woodland sites in the Illinois River valley (Asch and Asch 1981) and American Bottom (Johannessen 1984) were very poorly represented at the Lightfoot site. Seeds of these plants were recovered in higher frequencies from Late Woodland flotation samples from the Galum Crossing site (Powell n.d.) and Jamestown (Cremin 1985) in the Burning Star Mine #4, and their low representation at the Lightfoot site is notable. Most of the Lightfoot site features appear to have filled in naturally, and it may be that the flotation samples do not accurately reflect Late Woodland subsistence activities at the site. However, large limestone hoes interpreted as horticultural tools were not present at the Lightfoot site although numerous complete and broken specimens were recovered at the Galum Crossing and Jamestown sites in the mine. The absence of this tool type at the Lightfoot site may indicate that Late Woodland subsistence activities at the site did not include horticulture. In addition, the Lightfoot site faunal assemblage is not representative of Late Woodland faunal exploitation activities in the area, as the site contains a restricted range of species in comparison to the larger Late Woodland Jamestown site (Falk 1987). Similar to the botanical assemblage, this difference may indicate that smaller Late Woodland sites such as the Lightfoot site represent seasonal nut collection and hunting camps.

Material Culture

Ceramic artifacts associated with the Late Woodland occupation were tempered primarily with crushed igneous/metamorphic rock and grog. A total of 12 vessels was represented with only 3 vessel forms defined: (1) a recurved jar with a single row of interior punched nodes located

below the vessel rim; (2) restricted orifice jars with inslanting rims and a single row of interior punched nodes located below the vessel rim; and (3) unnoded restricted orifice jars with inslanting rims. Cordmarking was coarse and shallow with the cord impressions frequently overlapping. Rim modifcation was restricted to the interior vessel lip and consisted of slashes and dowel impressions. In sum, a restricted range of vessel types and rim modifications is contained in the small assemblage. No other types of ceramic artifacts were recovered at the Lightfoot site although ceramic discoidals, figurines, and beads were associated with Late Woodland occupations at the Burning Star (21C4-3) and Jamestown (21C4-14) sites in the mine (Pulcher 1974b; Wagner 1986b).

The lithic assemblage from the Lightfoot site also contains a restricted range of tool types in comparison to the larger Late Woodland sites in the mine. Koldehoff (this volume) identified the production of flake tools and biface maintenance as primary activities during the Late Woodland occupation of the site. Projectile points/knives included expanded base or weakly side-notched specimens similar to those associated with early Late Woodland occupations in the American Bottom and other parts of Illinois. Flake tools consisted of cutting and scraping edges on core and biface reduction flakes and on shatter. Source analysis of chert types indicated intensive exploitation of the local galcial till and Blair/St. David cherts although cherts from other areas, including the Mississippi valley to the southwest, the Shawnee Hills, and the American Bottom, also were represented. Groundstone tools definitely associated with the Late Woodland occupation included expediently used igneous/metamorphic cobbles and a celt fragment. Similar to the ceramic assemblage, the lithic assemblage does not contain the full range of stone artifacts known to be associated with the Late Woodland occupation of the upper Galum Creek valley. As mentioned previously, most apparent is the absence of limestone hoes at the site, a tool type that was well represented at the larger Galum Crossing (21C4-29) and Jamestown (21C4-14) sites. Other artifact types present at the larger Late Woodland sites in the mine but not represented at the Lightfoot site include discoidals, pendants, pipe fragments, and mortars.

Site Activities

Koldehoff (Chapter V) provided a preliminary analysis of site activities based on his lithic analysis. Briefly stated, this analysis indicated that hunting, collecting, and the initial processing of subsistence and tool maintainence items were the principal Late Woodland activities at the site. General cutting and scraping tasks were the best represented activities together with flake tool production and hafted biface maintenance. Koldehoff concluded that the Lightfoot site represented a single family habitation site at which basic household production and maintenance activities were carried out.

Combining the lithic analysis with the other analyses provides a more complete picture of site activities during the Late Woodland occupation. Analysis of the site plan revealed that pit features were

distributed across the site with no distinct clustering. Only two functional types of features--possible storage pits and cooking pits--were defined. The majority of the features contained very little material and appeared to have filled naturally as opposed to being intentionally filled with refuse. A cluster of post molds at the eastern edge of the site was interpreted as either the remains of a small pole structure or a larger structure disturbed by plowing and the mechanical stripping.

In sum, a limited range of activities appear to have occurred at the Lightfoot site during the early Late Woodland period (A.D. 400-600) in comparison to the other Late Woodland sites in the mine. The absence of discrete feature clusters, the small amount of material within the features, and the small size of the post pattern all suggest that Late Woodland occupations at the site were short term and occurred on an intermittent basis. Based on the subsistence and other data, the site is interpreted as a hunting and nut collecting camp that was utilzed on a short-term seasonal basis by individuals or small groups whose primary residence was located elsewhere in the area.

A Preliminary Examination of Late Woodland Settlement in the Upper Galum Creek Valley

The 1974 survey and salvage excavations (Pulcher 1974a, 1974b), 1979 cultural resources survey and test excavations (Haas and McNerney 1980, 1986), and the 1980-1984 Phase III excavations within Burning Star Mine #4 recovered a large amount of information regarding the Late Woodland occupation of a small stream drainage in interior southern Illinois. Late Woodland settlement patterns within the upper Galum Creek valley appear to differ significantly from those of earlier and later prehistoric occupations. A brief examination of prehistoric settlement patterns within the mine area is presented below in order to illustrate the change that occurs during the Late Woodland period.

Transitional Paleo-Indian (Dalton) and Early, Middle, and Late Archaic occupations within the upper Galum Creek valley are represented primarily by culturally diagnostic projectile points/knives recovered as isolated artifacts from ridge spur edges overlooking the creek bottoms. Archaic period artifacts also were recovered from the base of the midden at the Jamestown site. Three sites (21C4-27, 60, and 129) overlooking the main channel of Galum Creek contained high frequencies of Archaic period artifacts. Tool assemblages from these sites included projectile points/knives, scrapers, drills, manos, mortars, a prismoidal atlatl weight, an ax, and lithic debitage. Caches of grinding stones were found resting on the stripped surface at both the Singletree site (21C4-27) and site 21C4-60. Archaic pit features were not identified at any of these sites which appear to represent short-term hunting and nut collecting camps utilized throughout the Archaic period by individuals or groups whose primary residence was located outside of the project area (Wagner n.d). No large, intensively occupied sites that may have served as base camps similar to those documented in other areas of Illinois (Brown and Vierra 1983; Jefferies and Lynch 1983; McElrath

et al. 1984) and eastern North America (Broyles 1971; Chapman 1975) were identified.

Early to Middle Woodland occupations within the mine are represented by Cypress, Saratoga, and Affinis Snyders projectile points/knives that have a similar distribution to the earlier Archaic period artifacts.

Crab Orchard ceramics were recovered in small quantities from the lowest levels of the site middens at the Jamestown (21C4-14), Cutler (21C4-34), Singletree (21C4-27), and Lightfoot (21C4-35) sites along Galum Creek and from two sites--Bonnie Creek (21C4-46) and Kipling (21C4-132)--overlooking the Bonnie Creek floodplain. Despite the presence of Crab Orchard ceramics, however, the complete mechanical removal of the plow zone at four sites (Jamestown, Singletree, Bonnie Creek, and Lightfoot) and controlled and mechanical excavations at the remaining two sites uncovered only a single Crab Orchard basin at the Lightfoot site. The absence of intensively occupied Early and Middle Woodland sites suggests the continued utilization of the upper Galum Creek as a transitory hunting and foraging area throughout this period.

The Late Woodland (A.D. 400-1000) occupation of the upper Galum Creek valley differs significantly from that of the preceding cultural periods. The first evidence of permanent occupation of the creek valley occurs during this time as opposed to the transitory seasonal utilization of the area during the Archaic and Early and Middle Woodland periods. At least four types of Late Woodland sites exist within the upper Galum Creek valley. These include large, intensively occupied sites such as the Burning Star (21C4-3), Jamestown (21C4-14), and Galum Crossing sites which may have been the focus of human activity within the drainage on a year-round basis. Characteristics of these sites include the occurrence of pit features in discrete clusters; the presence of a variety of pit feature types including earth ovens, deep storage pits, rock lined hearths, and graves; the presence of pit houses at all three sites; and, in the case of the Jamestown site, an organized community plan in which pit feature clusters and structures were distributed around the perimeter of a large open area, the center of which was marked by at least two large posts. These large sites contain a high frequency of cultural material and a varity of lithic and ceramic artifacts that are not represented at the other Late Woodland sites in the area, including limestone hoes, discoidals, ceramic figurines, and miniature vessels. The botanical assemblages from the Jamestown (Cremin 1985) and Galum Crosssing (Zalucha et al. n.d.) sites are dominated by hickory nut remains. The starchy seed complex plants such as Polygnum erectum and Chenopodium sp. are present but of minor importance, and Meso-American cultigens are completely absent. Faunal data from these larger sites indicate exploitation of a broad spectrum of avian, terrestrial, and aquatic resources from both the bottomland and upland environments (Barr and Bloom n.d.; Falk 1987).

The second site type is represented only by the Lightfoot site. These are smaller sites (less than 2,000 m^2 in the case of the Lightfoot site) that contain a relatively large number of pit features but which

lack an organized community plan and exhibit low artifact frequency and tool diversity. These sites may represent seasonally occupied hunting and foraging camps which are utilized on a short-term basis by individuals or small groups whose primary residence is located elsewhere.

The third site type is represented by the recovery of culturally diagnostic Late Woodland projectile points/knives as isolated artifacts at numerous sites within the mine, including two sites--Singletree (21C4-27) and 21C4-60--at which Phase III mechanical excavations were conducted. As noted previously, these sites were utilized from the Early Archaic to Late Woodland periods with the lithic assemblages including projectile points/knives, scrapers, manos, hammerstones, mortars, and lithic debitage. Most of this material appeared to be associated with the Archaic period occupation although the presence of Late Woodland projectile points/knives at both sites suggests that some of the nondiagnostic material could be Late Woodland. These sites appear to have been hunting and foraging camps that were utilized on a short-term basis during the Archaic and Woodland periods, with this activity ending following the Late Woodland period. Mississippian artifacts were not recovered at either site.

The fourth site type consists of mortuary sites, represented by a single small earthen burial mound (21C4-123) located on the same ridge spur as the only Mississippian cemetery (21C4-9). Hand and mechanical excavation of the approximately 12 m^2 mound revealed that Late Woodland body sherds were present within the mound fill. At least three badly decomposed human burials were located within the mound, which lacked any significant internal stratigraphy or features.

Whether all four site types comprise part of the settlement system throughout the entire Late Woodland period is unknown. Some evidence suggests that at least one of the site types--the larger, more intensively occupied sites such as the Burning Star, Galum Crossing, and Jamestown sites--may not be present in the area until ca. A.D. 600-800. Evidence for this comes from the Jamestown site at which early Late Woodland ceramics similar to those of the Lightfoot site were recovered primarily from features at the north end of the site, with two of these features dating to A.D. 450±120 and A.D. 540±50. This concentration of early ceramic material and early radiocarbon dates at the north end of the site suggests that during the initial Late Woodland occupation of the site, the central open area and centerposts may not have been present and that a small early Late Woodland occupation was located at the north end of the site. A radiocarbon date of A.D. 700±100 years was obtained on wood charcoal contained within one of the centerposts, suggesting that the more formal site arrangement may not have developed until ca. A.D. 600-800 (Wagner 1986b). Based on the radiocarbon dates, the Jamestown site continues to be occupied during the terminal Late Woodland period, with five of the eight dates from the site clustering in the ninth and tenth centuries A.D., ranging from A.D. 820±100 to A.D. 990±60. The Jamestown site was the only site in the project area to produce Late Woodland Dillinger (ca. A.D. 950-1050)

ceramics, with Dillinger pit features scattered around the periphery of the site (Wagner 1986a, 1986b).

The Mississippian occupation at the Lightfoot site conforms to the documented Mississippian settlement pattern in the upper Galum Creek valley (Wagner 1986a:251-254). The single structure at the Lightfoot site is interpreted as the remnants of an individual homestead that was part of a settlement system of small dispersed homesteads within the upper Galum Creek valley during the Mississippian period. Given the hierarchal nature of Mississippian society, these homesteads were probably part of a larger settlement system that included more complex communities such as the Bridges site of the lower Kaskaskia valley (Hargrave et al. 1983). As discussed in the Bonnie Creek site report (Wagner 1986a), a possible candidate for one of these larger communities is the Brune site in the Southfield of Burning Star Mine #4 which is reported to have contained multiple structures and a cemetery of 30 to 40 individuals prior to its destruction in the early 1970s (Pulcher 1974a). Although no radiocarbon dates were obtained on the structure at the Lightfoot site, radiocarbon dates from other Mississippian sites in the project area suggest that Mississippian occupations in the upper Galum Creek valley date to ca. A.D. 1150-1450 (Wagner 1986a:241). Evidence of earlier occupations was not found, but this could be a reflection of the fact that the project area represents a small, arbitrary slice of the upper Galum Creek drainage. Earlier Mississippian occupations could be present in this section of the Till Plains but were simply not contained within the limits of Burning Star Mine #4.

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